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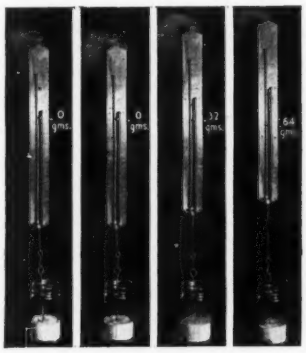

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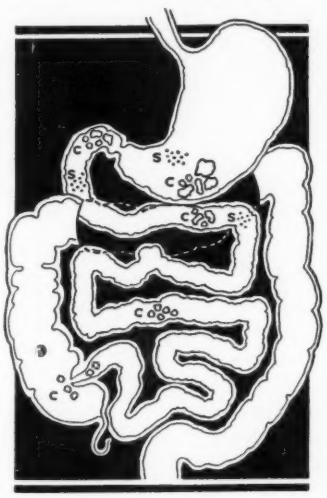

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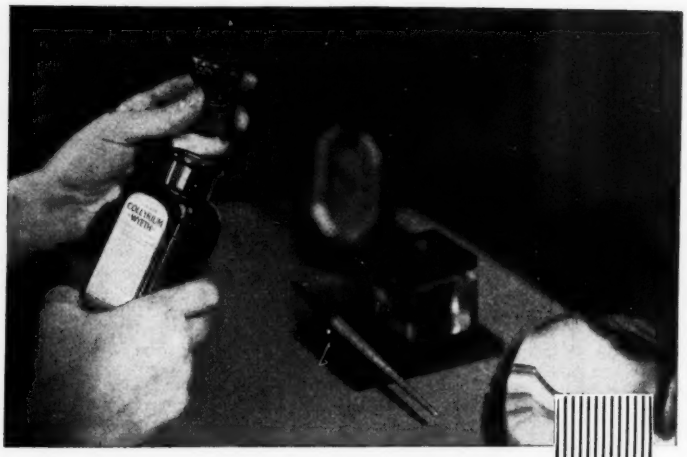

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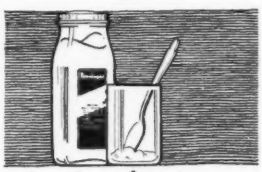

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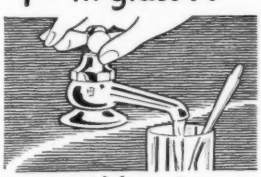
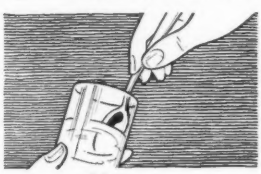


2— add water . .



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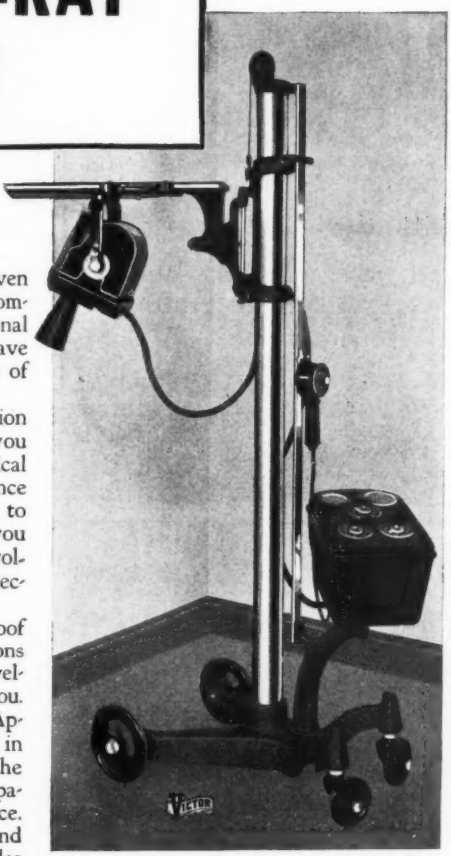

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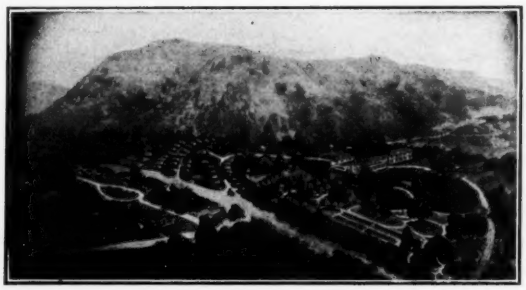

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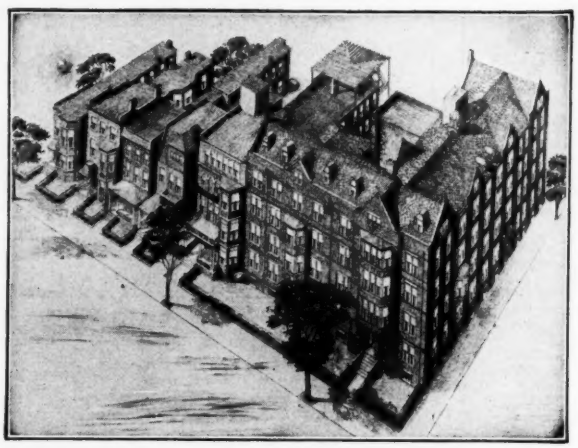

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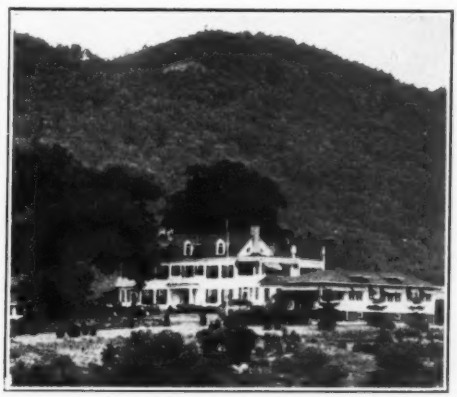

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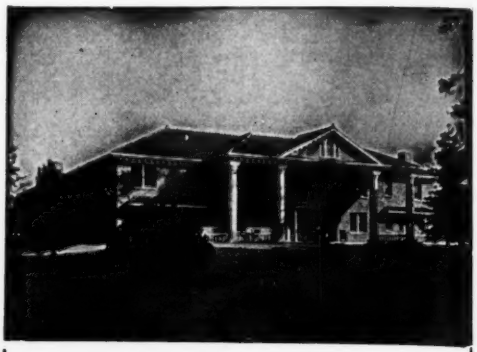

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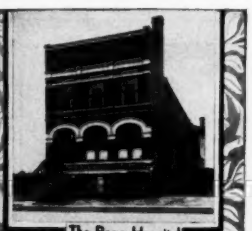
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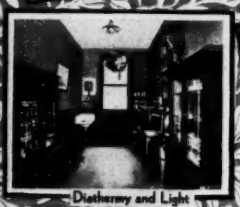
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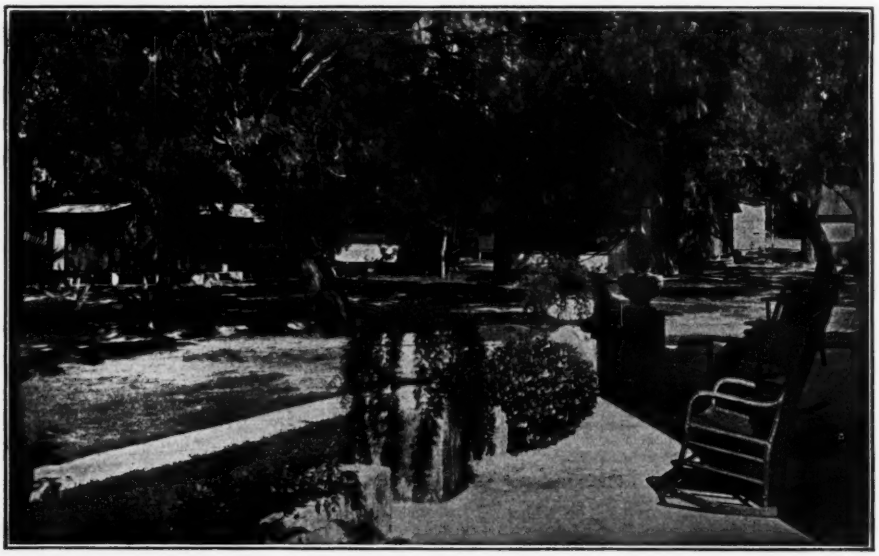

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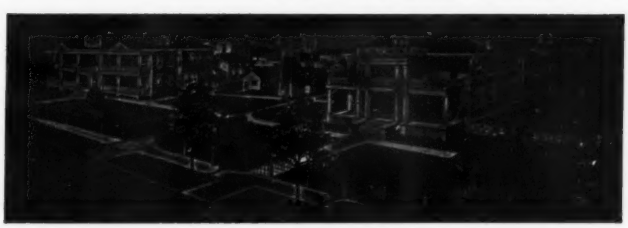

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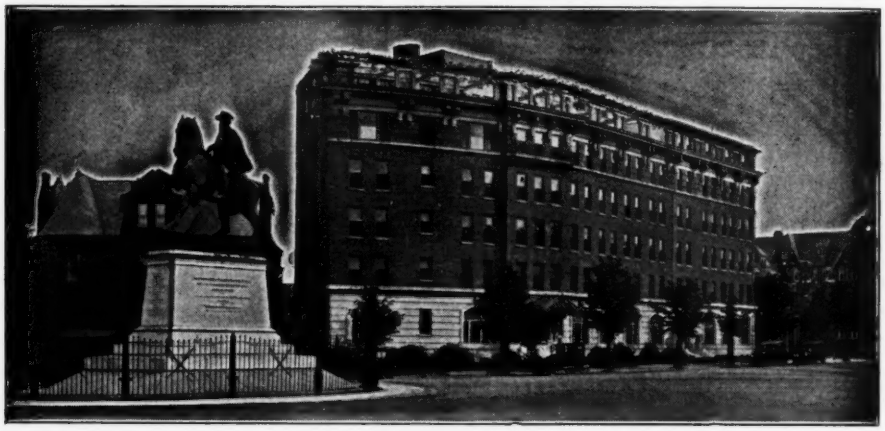

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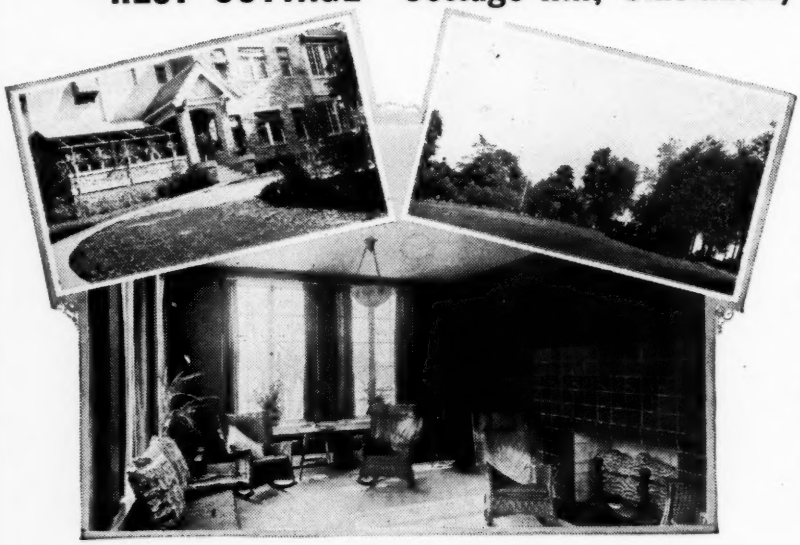

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Volume XXV OCTOBER 1932 Number 10

ABDOMINAL SYNDROMES OF EXCEPTIONAL INTEREST: THEIR UNDERLYING PATHOLOGY*

By ERNEST H. GAITHER, M.D.,
Baltimore, Md.

PART I

Abdominal diagnosis resembles in various details its fellow science, archaeology; both must reason *a posteriori;* both find their greatest triumphs in tracing hidden levels; but here they diverge; the farther the archaeologist delves, the greater his enlightenment; while the farther the abdominal diagnostician seeks, and the wider and deeper his experience, the more clearly he realizes how large is the number of syndromes presenting atypical, puzzling, frequently even baffling symptoms. The possible and probable causes of these have not yet been adequately dealt with by text-books nor by current literature, despite the earnest endeavors of many who are not only intensely interested, but exceedingly skilled in research in the abdominal domain.

It is one thing to read in text-books the clear-cut description of an uncomplicated syndrome indicative of a definite underlying pathologic change; but quite another affair to cope in real life with a blurred, bizarre, symptom-complex, perhaps almost unintelligibly presented by patients in private practice, in hospital, or in polyclinics.

Experience has shown that symptoms vary from time to time because of subtle, progressive and continued change in the pathological condition which may affect the psyche of the patient; it is also true that functional changes in the domain of motor, secretory and sensory powers are continually taking place. The disease is often masked by atypical symptoms; less often no symptoms whatsoever are presented, and in such cases dire catastrophe may occur, since the malignant disorder stealthily creeps upon an unsuspecting victim who has been unwarned by the usual subjective symptoms and objective signs.

While a comprehensive knowledge of abdominal symptomatology is naturally essential in abdominal diagnostic work, yet of even greater importance, and indeed of basic value, is the thorough and vivid conception of the physiology and pathologic physiology of the mechanism which receives, propels and distributes the various stimuli; since these sensations eventuate in symptoms which to us will be possessed of illuminating and important diagnostic worth.

It is my hope that the atypical cases I have to present and discuss will arouse interest in the efforts now being made toward a more thorough understanding of the mechanism concerned in the various abnormal sensations; for thus we may eventually establish the fundamental causes of these variations from type, as well as new syndromes which will facilitate the diagnosis of early pathological conditions. I shall adduce the evidence of certain recent writers in regard to the physiology and pathologic physiology of the mechanism of abdominal discomfort and pain, feeling that we shall gather from their researches much of diagnostic value.

Caution must be our watchword in each case where the symptoms are not illuminative and the syndrome not indicative of any particular lesion; also when the most painstaking investigations give no clinical evidence of functional disturbance.

At any age, but particularly beyond forty, we should be inquisitively suspicious of malignant disease, not failing to remember the possibility of the role played by senile degenerative changes; with sclerotic processes, tuberculosis and lues to be considered in those cases in which the symptom-complex is unusual and bizarre.

After one or more unsuccessful investigative excursions we are very apt to damn an unre-

*Read in Section on Gastroenterology, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

*From the Digestive Clinic of Johns Hopkins Hospital.

sponsive patient as a troublesome neurotic; and here we often err, to the detriment of the patient, and our own later chagrin and embarrassment. Hence my present plea for repeated, and even re-repeated, investigations into the cases of such unfortunates as have been labeled psychoneurotics because of their continued complaints.

I am particularly eager to call to your attention the vital importance of biopsy. Nodules of apparently insignificant size, wherein symptoms have been present and persistent for some time, with gastrointestinal series, serological and other types of investigation absolutely barren of result, may eventuate as in the following case of a man of fifty-three years:

Case 1.—After continued observation and thorough investigation the patient was diagnosed as a psychoneurotic. A few small nodules just above the costal margin were noted, but had been considered by clinicians as innocent fibromyomata. However, biopsy showed wildly growing cells which could not be pathologically classified. During the months the patient had been observed, symptoms indicative of right lower and right upper quadrant disease had been present. However, because of the overwhelming neurotic manifestations and the lack of evidence of functional or organic disturbances of the various organs, serious attention to the patient's complaints was not considered necessary. Autopsy revealed widespread malignant involvement of the liver with metastatic growths to the pleura, heart, spleen, pancreas, kidney, as well as various subcutaneous areas.

Such an experience is the price paid for evading the issue. Attacking the puzzling syndrome from every conceivable angle, after clinical investigations proved barren of result, might have saved the situation for the diagnostician, if not for the patient.

It is sometimes impossible, even after the most comprehensive investigations, to differentiate between acute or chronic disease of the appendix, and gall-bladder involvement; and it is surprising to note the number of instances in which one cannot determine from either history or physical examination whether the disease is in the gall-bladder or the appendix.

As an excellent example of atypical abdominal disease with inconclusive symptoms and clinical findings, I shall present very briefly the following case:

Case 2.—A white man of twenty-five years, six years before consultation had had gonorrhea and recovered. Two years before admission to the hospital he noted burning pain across the abdomen at the level of the umbilicus, with gas after nearly every meal. The attacks appeared every month or two and remained from a few seconds to a few hours. The last outbreak was noted some months previously. Gas pains started in the region of the umbilicus, passed up, and gave him a feeling of pressure in the chest. Belching gave a fair amount of relief. The night before admission he noted a sudden and severe pain which started about fifteen minutes after the evening meal; it was in the right side at about the level of the umbilicus and was sufficiently severe to double him up; he was nauseated and vomited; the bowel was not constipated.

Physical Examination.—The abdominal walls moved freely; there was no distention. In the right middle quadrant was a smooth sausage-shaped mass, not especially tender, which did not seem to move with respiration, but ran parallel to the ascending colon and was lost under the costal margin. There was moderate epigastric tenderness and muscle spasm, but no true rigidity. The urine was negative. White blood cells were 16,200 to 6,100; polymorphonuclears, 74 per cent; hemoglobin, 85 per cent; red cells, 5,300,000. Wassermann was strongly positive at two examinations. The stool showed positive guaiac test at three examinations. Temperature was 97 to 100.2°, pulse 60 to 100. Gastrointestinal and gall-bladder studies were negative.

At operation the appendix was definitely thickened, with subacute inflammation and several adhesions. A large, distended gall-bladder with a purplish-red surface contained a large blood clot and several small stones; a smooth mucous surface with many small stones; and microscopic examination showed the walls thickened by fibrosis and infiltrated with fluid and wandering cells. There were many polymorphonuclear leucocytes. The appendix was 7.5 cm. long; its surface was covered with inflammatory membrane; and its walls were thickened.

The diagnosis was cholelithiasis, fibrous appendicitis and subacute cholecystitis. Such a case is an excellent example of the difficulty encountered in correlating various symptoms with such clarity and decisiveness as to be enabled to make a correct preoperative diagnosis.

Case 3.—This case well exemplifies the misleading symptom-complex which may accompany carcinoma, that most dreaded of maladies. The patient was a married woman of twenty-nine years. Seven weeks previous to consultation the patient had had "grippe;" following this, she developed a constant dull, burning pain across the lower abdomen. This persisted for about a week; it had no relation to eating, defecation, or micturition, but was relieved by rest and aggravated by fatigue. A week after its onset the pain stopped and she developed a very severe ache in the small of the back, which tended to radiate upward and somewhat to the right. This aching was very steady and persistent up to the time of admission to the hospital, though it became less intense; it was not affected by any treatment. Eight days before admission she had been awakened by a sharp, cramp-like epigastric pain and found the epigastrium much distended with gas. The pain was confined to the epigastrium, but moved about within this limit. It remained of about the same intensity until admission. After its onset she had taken only milk and egg-nog, and had always vomited these within from five minutes to three hours. The bowel had moved only once, following an enema, laxatives having proven ineffectual. The symptoms had been remarkably constant for eight days.

Physical Examination.—A well-nourished young woman, apparently very ill, was vomiting. Her pupils

and reflexes were normal. The throat was very red and angry in appearance; the tonsils were sparsely covered with yellow raised follicles which apparently contained pus. The heart showed no enlargement and was negative. Blood pressure was 125/70; lungs were negative.

The epigastrium was tense; the patient resisted every attempt at deep or light palpation. Deep inspiration caused a sharply localized pain in this region. The liver edge could not be palpated, owing to tenderness here. Pelvic examination showed marked leucorrhea. The cervix was lacerated; the uterus was retroflexed, although the organ was forward. The urine was normal, white cells were 22,000, temperature 101.8 to 99.2°, pulse 100 to 91, and respirations normal. X-ray examination showed the lung fields negative. The diaphragm was in the usual position.

Preoperative diagnosis was (1) acute perforation of peptic ulcer; (2) acute pancreatitis or cholecystitis.

Post Mortem.—The chief finding was malignant disease which involved the entire pancreas, the kidney, one ovary and the retroperitoneal tissues. It was impossible to say in which of these organs it may have been primary.

From this case one can readily observe the difficulties frequently encountered in interpreting a syndrome with sufficient clarity to establish a disease which operation may demonstrate or necropsy alone reveal.

Case 4.—A white man forty-nine years of age, three years previously had a rather sudden onset of a "dead, heavy ache" in the abdomen, around and above the umbilicus. The attacks were intermittent and there was no particular relation to food intake, character of food, posture, seasons, or exercise. Several weeks before, he lost ten pounds in ten days. He described his symptoms as being in the same area as noted above, and consisting of a peculiar throbbing, and the "dead, heavy aching," a sensation as if his heart leaped forward; sometimes a feeling of suffocation. The bowel moved daily; there was no nausea or vomiting. There was a history of diabetes, but no evidence of it in the blood or urine at this time.

Physical Examination.—His weight was 148½ pounds; normal for his height is 177 pounds, and average 157 pounds. The upper extremities were negative. In the abdomen, a small, sausage-like mass in the mid-epigastric region was interpreted as transverse colon; other findings were negative. Gastric analysis, blood, and blood chemical examinations were normal. Stools showed in four examinations occult blood one to four-plus.

In the first x-ray report the stomach and duodenum were normal. The passage of the barium through the small bowel, particularly the terminal loops of the jejunum and ileum, was slow, and several of the films showed a ragged, irregular filling. This evidence was very suggestive of organic disease, possibly a malignancy. Two barium meals were given. At 20 hours following the first meal a residue of barium remained in the terminal loops of the ileum. At 22½ hours following the second meal, a slightly larger residue remained in the terminal loops of the ileum. The cecum and appendix were high. Another radiologist made the same report, but was impressed with the fact that a fluid level was not established, and hence he hesitated to make a diagnosis of malignancy. He was also impressed by the high position of the ileocecal region and felt that some abnormality was present, possibly primarily a congenital anomaly. The first physician had advised the patient to return home, set his house in order, and be prepared to depart hence in a few months.

Operation revealed a band of adhesions extending from the duodenum to the gall-bladder. No other abnormality was discoverable and the anatomic relationships were normal. The patient made a splendid and uneventful convalescence and returned home facing a bright and normal future.

Case 5.—A white man fifty-five years of age complained of a pain in the right upper quadrant, first noted two years before. It appeared at irregular times, particularly with fatigue, was noted mostly at 3:00 to 4:00 p. m., remaining until a hypo was administered. It was decidedly intermittent in character. There was no nausea nor vomiting. The bowel was constipated and mucus was noted at times. The symptoms improved during cold weather, were intensified by exercise; the patient had had jaundice 22 years before. In 1929, the appendix was removed; the patient had relief for four months, after which the symptoms returned, accompanied by nausea and vomiting. Eating at times relieved him, while on other occasions the discomfort was intensified by food intake.

Physical examination yielded no helpful information.

On October 12, 1930, other than the discovery of an irregular duodenal cap, the gastrointestinal x-ray studies were negative.

June 10, 1931, x-ray studies proved the presence of an irregular duodenal cap; otherwise the gastrointestinal studies were negative.

June 18, gall-bladder studies showed evidence of adhesions in the gall-bladder area and also the presence of stones.

At operation, June 20, extensive right upper quadrant adhesions were seen, producing partial duodenal obstruction. There was a diseased gall-bladder with stones; and an old duodenal ulcer. Cholecystectomy and gastroenterostomy were performed, as the adhesions were too extensive to permit of a plastic operation in the pyloric-duodenal region.

Several days after operation the patient began to vomit large quantities of fluid; this persisted, and a diagnosis of obstruction at the gastrojejunal anastomosis was made. Operation was performed. Let us note the interesting and unexpected findings. Dense adhesions in the ileocecal region were causing obstruction of the bowel; there were adhesions between the anterior abdominal wall, omentum and small intestine; the small bowel proximal to the obstruction was markedly dilated and cyanotic. The large bowel, just beyond the point of obstruction, was collapsed; the posterior gastroenterostomy appeared to be in good position. The remarkable features of this case are: first, that no one suspected the old pathological condition as an etiologic factor; and second, the coincidence of an acute obstruction caused by postoperative adhesions produced by operation four years previously, and the lack of influence of the recent gastroenterostomy.

Case 6.—The woman under consideration had had for a number of years attacks of "indigestion" characterized by epigastric pain occurring between two and three hours after food, and frequently relieved by food

and alkaline medicine. After a week or two of severe indigestion operation was performed and the diagnosis of perforation was confirmed. The ulcer was high up in the fundus, near the lesser curvature. Preoperative notes read: (1) there has been a chronic lesion, an ulcer near the pylorus. (2) It has partially ruptured and been sealed up soon after rupture. (3) It is superiorly situated, towards the lesser curvature. (4) There has been slight extravasation only. (5) Possibly the ulcer is protected by old adhesions. (6) A subphrenic abscess may develop. These predictions were correct enough, except that the ulcer was nowhere near the pylorus. Several years later the patient exhibited gastric symptoms with pain across the epigastrium, but no tenderness on pressure, the pain being of the hunger kind, and often felt during the night and at the left shoulder blade. Food relieved the pain. She was treated medically, but had these symptoms off and on for several years. Five years later a consulting physician confidently diagnosed duodenal ulcer. X-ray examination apparently revealed an hour-glass stomach. In the autumn, the surgeon who had achieved a brilliant success at the first operation again opened the abdomen. The liver, stomach and omentum were adherent to the anterior abdominal wall, and the liver was also adherent to the pylorus and lesser curvature. The cardiac end of the stomach was fixed far back under the diaphragm. The hour-glass of the x-rays was due to perigastric adhesions and there was no duodenal ulcer. All was dealt with as far as possible. Later in the same year there were still symptoms, nausea, vomiting and slight blood, and troublesome pain in the epigastrium, infallibly relieved by food or alkalies. The vomited matter, when analyzed, showed subacidity. All agreed that the symptoms, including "hunger pain," were due to recurrence of the old fundal and now densely adherent ulcer. Eventually, under medical care, this healed and today the patient is well. Pure symptoms were no guide to the actual condition, hunger pain occurring with a fundal gastric ulcer.

This is a beautiful example of what we are taught to believe is a syndrome indicative of a lesion in the duodenal area. However, operative procedure revealed the absence of any lesion in that area and showed the involvement to be at a distance, notably high up in the fundus. Duodenal ulcer being again diagnosed later, in spite of the previous operative finding, a second operation verified the fact that the lesion was not duodenal in character and showed, furthermore, that the abdominal symptoms were aggravated and complicated by demonstrated adhesions.

In order to set clearly before you the various structural changes which take place in progressive pathologic processes, both preoperative and postoperative, I shall quote a few paragraphs from a previous publication by Dr. Hughson and myself:

"We desire to discuss very briefly the role played by primary residual and postoperative pathology in cases not aided by operation.

"Let us consider in retrospect the various happenings and changes which may occur from the beginning to the end of peptic ulcer, with its many interesting, and frequently serious, complications.

"First, there is an intracellular change, the exact character of which is still obscure. This phase is usually followed by spasm; the chemical change and spasm interfere with circulation and this interference is in turn succeeded by disturbed nutrition and subsequent loss of proper function, accompanied by structural changes; the ultimate result is circumscribed necrosis and ulceration. The last pathology may assume various roles; it may, after moderate progress, penetrate more or less deeply through the different structures which constitute the gastric or duodenal wall; it may abruptly cease and begin a healing process; or it may in its recurrence corrode a vessel wall with the production of oozing, and mild or profuse hemorrhage.

"Perforation with local or generalized peritonitis may occur. Again, there may be a very subtle and gradual process whereby an inflammatory exudate precedes the perforation and there is adherence to the surface of the neighboring organs and tissues; if the ulcerative lesion is on the gastric side, and healing does not occur, it is possible for malignant processes to appear.

"In many cases there occur perigastritis, peripyloritis and periduodenitis, with their resultant adhesions to adjacent organs and tissues; further, a considerable area of edematous infiltration may surround the ulcer, forming a true mechanical obstruction and bringing about an almost complete closure of the pylorus; or the ulcer scar may gradually contract and bring about a state of complete closure of the pylorus, followed by hypertrophy of the gastric musculature; this in turn is succeeded by atonicity and gastric dilatation.

"This brief description reminds one of the important part played by primary pathology in subsequent postoperative symptomatology and pathology, and it is not difficult to realize the resultant residual pathology in the way of motor, secretory and sensory disturbances because of spasm; organic obstruction, with stagnation of food; muscular hypertrophy, followed by atonicity and dilatation; also corrosion of vessels; and perforation, rapid or gradual; adhesions to various organs and surrounding tissues; and finally, the possibility of malignant degeneration.

"We shall mention briefly the changes that occur. In the case of the gall-bladder there are: infection with inflammation, adhesions and gallstones; the appendix may have cicatricial changes in the organ itself, and many times extensive adhesions to the surrounding tissues, resulting in kinks, twists and definite functional pathology. Now add to primary, postoperative and residual pathology, as described above, the procedure of incising, tearing and suturing, and you will gain some conception of the conservatism necessary in the prognosis of cases presenting digestive pathology requiring not only primary but secondary surgical interference."

PART II

I trust that a sufficient number of puzzling clinical pictures has been presented. You will note that both preoperative and postoperative cases are included, and that an effort

has been made to outline clearly the various stages of progressive complicating conditions, which at length were discovered at the root of the bizarre and atypical syndromes.

Let us now consider the physiology and pathologic physiology as regards discomfort and pain pathways in the nervous systems; here we may bring to light facts and theories which will not only advance our knowledge, but also, we hope, stimulate physiologists, pathologists and clinicians to yet greater efforts toward the establishment of those illuminating facts which will bring nearer the happy day of earlier and more complete diagnoses.

It is well to remember that a rich nervous supply places the alimentary tract and the other abdominal organs under the influence of multitudinous impulses arising in all parts of the body; and in this connection, too much emphasis cannot be laid upon the fact that in a healthy state each organ undoubtedly functions well below its maximum capacity. With this in mind, it is easy to realize why objective signs, and, more particularly, subjective symptoms, do not aid us until advanced structural change has occurred. Furthermore, the vicarious activities of the different organs are often misleading, in this regard, and against all such possibilities we must be forever on our guard.

PART III

The medical profession is only too familiar with the controversy which has raged for many years in regard to the mechanism which gives rise to the sensations of discomfort and pain in various portions of the body. One school holds that the sensation of discomfort or pain does not originate in the disturbed organ itself, but is reflexly referred to the superficial tissues; the opposing school is emphatic in its conviction that the pain does originate and reside in the affected organs and tissues.

Various workers, notably Head, have presented elaborate charts showing the different pathways of the nerves, and it would appear from these diagrammatic presentations that the question of recognizing most of the syndromes indicative of disease would be but a simple matter; the simplicity, however, is not apparent when we are confronted with a problem in abdominal diagnosis, and the most minute history, the most extensive clinical investigations, have shed no light upon the problem.

Let us consider some of the difficulties of diagnosis in abdominal disease, particularly in its postoperative phase, taking first the very patent fact that we too often attack a problem from a monistic rather than a pluralistic standpoint; and thus we fail to recognize that a pathologic lesion, duodenal ulcer, for instance, is in the majority of cases progressive, attacking the mucosa, the submucosa, the muscularis, even penetrating and perforating the serosa, and so entering another world wherein fresh tissues and organs may be attacked and new changes established. Foreign impulses are in this way set up, resulting in changed symptomatology, which produces in its turn syndromes which are like nothing in medical literature, and we are put to it to evaluate correctly the multifarious symptoms so volubly complained of by the patient. And what is true of duodenal ulcer may be said likewise of such lesions as inflammation, ulceration, growths and abnormalities of all organs and tissues. Since patients presenting these vague, contradictory and variable histories have been known to harbor genuine cause for their complaints, I make it a rule to take seriously whatever part of the story seems consistent, and considering it aside from the obviously neurasthenic element of the case, pursue investigations into the possible and probable underlying cause.

An important point, too often overlooked, is that changes in the blood supply of the affected organ or organs, due to efferent or centrifugal impulses, cannot fail to influence subjective symptoms, and, in some cases, even objective signs. Another feature which we neglect to our own disadvantage, is that valuable attribute of the alimentary tract, its autogenous neurogenic control. Alvarez has shown that if the intrinsic nerve plexuses of the intestinal musculature are removed the muscle continues to beat. Here again we have a factor which may greatly influence the type of complaint.

I am thoroughly convinced that a comprehensive knowledge of the physiology and anatomy of the nervous systems is of outstanding importance in abdominal diagnosis; for in the absence of recognizable anatomical or morphological changes in the digestive tract, unmistakable abdominal symptoms due to neuropathological conditions may be presented. Furthermore, proofs are multiplying as to the interdependence of the vagal and sympathetic systems in their anatomical and physiologic mechanisms; whereas our earlier studies indicated

that they were definitely independent of each other. Hence the separation of signs and symptoms into clear-cut indications of one or the other system, as depicted in charts, is not nearly so simple a matter as it might appear.

As yet, of course, there is much in the psyche and other nervous systems which we do not clearly understand; but this is less an obstacle than a stimulus to further endeavor. A fuller understanding of neuroanatomy and neuropathology would incontestably prove invaluable in tracing the underlying cause of abdominal complaints.

Abnormal impulses are often initiated by bacteriologic and chemical changes in the alimentary tract, and because of such etiologic factors, peculiar syndromes may be established, or previous symptom-complexes greatly altered. It has been mentioned, but not as yet conclusively demonstrated, that various symptoms are produced by the secondary involvement of nerve structures rather than a primary lesion of specific disease; further enlightenment waits upon research in this field.

Residual sensitiveness and irritability must not be forgotten; they may persist in organs for some time after an invasion of inflammation or ulceration, notably in the cardiac and pyloric regions of the stomach, and in various portions of the intestinal tract after inflammatory or dysenteric involvement. One can readily understand how unphysiologic are the reactions produced by surgical interference, for incompatible types of tissue are thus brought into juxtaposition and forced to dwell in unity, if not in amity.

In entering upon the study of pain impulse and pain sense of the abdominal organs and tissues, we must consider the extraordinary functional capacity of each fasciculus of the vegetative system, abandoning the earlier conception that each may carry but a single impulse to a single organ or tissue. Again, and this adds to the complexity of our problem, we must remember that after a sufficiently severe stimulus, the receiving organs or tissues are likely to transmit impulses to yet other bodies, which in their turn give rise to subjective symptoms and objective signs most difficult of explanation. An example of this process would be a stimulus conveyed along the afferent nerve roots from a diseased organ. Under ordinary circumstances it would cause a hypersensitiveness in certain areas or organs. Should the stimulus be of exceptional severity, however, the reactions might spread to organs at some distance from those usually involved, taking the form of increased discomfort and pain, and a large area of muscular rigidity and unilateral tenderness, with rigidity and abdominal reflexes becoming bilateral. Such a spread of impulse and reaction is often noted in fatigued neurasthenics, and the difficulty of diagnosing such cases is only too obvious.

Efforts to plot definitely the vegetative system innervation of the abdominal viscera have thus far been unsuccessful, and until the accurate delimitation of such innervation areas has been accomplished, we shall be handicapped not only as to the interpretation of chronic changes, but more especially in the solution of the perplexities of incipient disease.

It is doubtless true that the vagus and the sympathetic nerves share the work of pain conduction; the vagus probably influencing the true viscera and the deep tenderness localized in the affected area itself; and the sympathetic serving the superficial elements, such as cutaneous and muscular hypersensitiveness and referred abdominal pain.

A thorough and deeply interesting piece of work on innervation has recently been done by Lebedenko and Brjussowa through animal experimentation. This should prove an inspiration for extended research on the subject. Their method was to resect spinal roots, divide the cord itself, or make some other separation of a known pain conductor path, the proof of sensibility being the severity of outbreak, either immediately after the experiment or from two to thirty days later. The pain irritation of the upper viscera would be brought about by squeezing or stretching the serous membrane, the walls of the organs and their vessels, inflating the hollow organs, or by an injection of 5 per cent barium chloride solution, inducing cramps.

They also resected or extirpated one or another organ, instituting successive examinations of the paravertebral and prevertebral ganglia, and made a series of studies of the vasomotor and trophic changes which occur in the parenchyma or the walls of the upper abdominal organs. They present a most interesting report in regard to the mutation of cells in the paravertebral and prevertebral ganglia, when one or more abdominal organs were partially resected

or extirpated, and demonstrate that the destruction of a single sympathetic ganglion will be manifested in extensive changes in a whole series of organs.

Comparing these findings with the symptoms displayed in man, when only one organ harbors disease, and particularly if an advanced stage is present, they become most significant, promoting the probability that the innervation of the upper abdominal organs is by no means confined to a small number of segments.

The sensibility of parenchymatous organs such as the liver, spleen and pancreas, has unfortunately not yet been greatly illuminated, despite the amount of research expended. It is interesting to note that Lebedenko and Brjussowa did not confirm in a single case the existence of pain conductors in the anterior roots, whose resection had no influence upon the conduction of pain impulse; but their experiments do conclusively prove that the depth and width of the anesthetized area did not exceed the loss of sensibility which could be obtained by transverse section of the posterior roots alone.

In their final conclusions these investigators state that the viscera are not innervated according to the same laws which hold for the voluntary system, and that one cannot argue for a rigid segmentary innervation, since that would be to a certain extent a contradiction of the clinical results. The sensation innervation of the upper abdominal organs, as well as the vasomotor, cannot be brought within the limits of a small number of segments, since the upper abdominal organs and those of the thorax and the lumbar area of the sympathetic cords are intricately connected. It is possible that sensation may thus play a role which, in the thoracic cavity, under the influence of mechanical pressure changes, in this and other displacements of the thoracic organs, may be carried over through the sympathetic paths of the uppermost thoracic segments of the cord boundaries, or through the aortal plexus. This all-important question as to the paths of pain impulse can be answered only in the clinic and in surgical attack upon the treatment of pain.

Very little is as yet known about the interchangeable tasks of the vagus and the sympathetic, the ganglia and intrinsic plexuses of the gastric wall; the delimitation of activity of the "extragastric antagonistic nervous systems" is still more obscure. That the antagonism is purely supposititious becomes plain when both systems merge eventually into a state of complete clinical harmony. Some writers maintain that both vagus and sympathetic contain fibers stimulative and inhibitive of secretion.

When we consider how closely single organs and groups of organs are related in regard to embryonic developmental anatomy, primitive tissue, immediate or reflex nerve connection and vascular supply, we become more keenly cognizant of the enormous role played by motor, secretory and sensory imbalance and of the long road of patient research that stretches before us. I for one am most optimistic, after surveying the prospect, and feel sure that these inexplicable syndromes will some day become merely matters of patient analysis in the clearer light of new knowledge and their underlying pathology be plainly revealed, to the joyful content of the conscientious diagnostician.

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DISCUSSION (*Abstract*)

Dr. Daniel N. Silverman, New Orleans, La.—Certainly without the proper understanding of the physiology of the digestive tract we are at a loss to approach a solution and diagnosis of the true underlying state of affairs in many syndromes.

We speak of the neurasthenic and of the nerve control of the various organs, including the digestive tract, and perhaps we very often find cases of nervous disturbance. However, our difficulties are certainly realized when we take note of the nerve control work of men like Cannon and Alvarez. At a recent meeting Cannon brought out the fact that he has little belief in the sympathetic control of smooth muscle. He shows in his experiments that the heart beat, the functioning of the tail hairs of the cat, and I believe at times intestinal motility go on after the adreno-sympathetic control is severed.

It would appear at the present time that we have proof of the increase of our diagnostic acumen in the discovery of more cases of carcinoma of the digestive tract, especially in the rectum and stomach in younger individuals than ever before. Certainly it is not rare to see one of thirty or forty with carcinoma of the rectum or stomach.

Eusterman recently reported several cases of carcinoma of the rectum and stomach, with brain metastases, in which nearly every patient was under forty-five.

BILATERAL PHRENICECTOMY IN THE TREATMENT OF PERSISTENT HICCOUGHS*

CASE REPORT

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For the past few years, surgery of the phrenic nerve has proved itself most valuable in treating certain diseases of the chest. To Stuertz, in 1911, goes the credit of the first phrenicectomy for unilateral pulmonary tuberculosis, although Sauerbruch, in 1904, performed phrenicectomies for hiccoughs.

The treatments of hiccoughs date back to the early days of medical science. The following are the most popular present day methods:

(1) Crushing the phrenic nerve.

(2) Blistering the surface of the neck over the origin and course of the phrenic nerve.

(3) Digital compression of the cervical portion of the phrenic nerve.

(4) Faradic and galvanic currents applied to the region of the phrenic nerve.

(5) Injecting novocaine into the phrenic nerve.

(6) Injecting alcohol.

(7) Anesthetizing the cervical sympathetic chain.

(8) Traction upon the nerve by a ligature.

(9) Freezing with ethyle chloride.

(10) Resection of 1 cm. of the phrenic nerve.

(11) Unilateral and bilateral phrenicectomy.

(12) Avulsion of phrenic nerve.

(13) Rectal anesthesia with avertin.

(14) Packing of ice to throat, chest and abdomen.

(15) Anesthetizing with chloroform.

(16) Performing a spinal puncture.

(17) Gas anesthesia.

(18) Colonic irrigation.

(19) Administering iodine internally on cracked ice.

(20) Hypodermics of atropine, morphine and scopolamine.

The performance of a phrenicectomy is a rather simple procedure accompanied by little or no danger. In cases of hiccoughs of long standing which have not responded to the palliative and expectant methods, one should at first observe the findings of a fluoroscopic examination, determining the side or sides involved. If both sides are involved, perform a phrenicectomy first upon the side that is most involved, followed by a phrenicectomy upon the opposite side. I advocate this procedure in preference to subjecting the patient to trials and failures of injections of various kinds and to other methods which will give only temporary relief, if any.

D. S., a white woman, age 22, was admitted to St. Margaret's Hospital December 4, 1930. Her chief complaint was hiccoughs.

Eight years before she was operated upon for appendicitis, which operation was followed by hiccoughs for eight weeks. Six months later she was operated upon for intestinal perforation. Hiccoughs did not reappear until May, 1930, at which time they continued until the present date with slight remissions up to several days.

Examination revealed a large, well-developed woman, weighing 150 pounds. The nutrition was good, skin normal, there was no edema, and no jaundice. The joints, spine and reflexes were negative. The thorax was full, the diaphragmatic excursion equal on both sides, and respiration was interrupted by hiccoughs with decreased expansion. On percussion and auscultation the lungs were negative. The heart rate was 96 per minute, the volume poor, the rhythm regular, there was no pericardial bulging, the apex beat was in normal position, and no murmurs or thrills were heard. Blood pressure was: systolic 140, diastolic 100.

Examination of the pelvis and abdomen showed them essentially negative.

The patient was hiccoughing forty times per minute. Her temperature was 99.6°, pulse 104, respiration 35, urine negative, and blood count normal.

Hypodermoclysis of 5 per cent glucose in 2,000 c. c. of normal saline was given daily.

Scopolamine (gr. 1/100) and atropine (gr. 1/150) were given every four hours as needed.

December 5, 1930, fluoroscopic examination showed that the right diaphragm underwent greater contractions than the left. There was, however, some contraction of the left. No pulmonary abnormality was seen.

December 8, a right phrenicectomy was performed under local anesthesia. Immediately after cutting the phrenic nerve there was a cessation of hiccoughs for two or three minutes.

December 9, the patient continued to hiccough, but contractions were limited to the left side with only 80 per minute.

December 12, the patient continued to hiccough.

December 16, fluoroscopic examination showed that the right diaphragm had retracted and did not share in the hiccoughs except by referred motion. The left retracted vigorously. On deep respirations the left showed deep excursions; the right was immovable.

December 17, the patient continued to hiccough.

December 18, a left phrenicectomy with local anesthesia was done. Immediately after the left phrenic nerve was cut, the patient complained of shortness of breath, which soon subsided. The hiccoughs continued, but only to a slight degree.

December 20, hiccoughs continued, but were very slight, the movements being confined to the abdomen.

December 22, hiccoughs were slight and confined to the abdomen. Fluoroscopic examination showed that the diaphragm was drawn high upon each side and did

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not share in the hiccoughs. The diaphragm moved up very slightly with each inspiration.

December 26, the patient ceased to hiccough, but was very nervous.

December 31, there were no hiccoughs. The patient was much better.

January 5, 1931, the patient did not hiccough, but she had a severe cough with injected pharynx.

January 10, she was very nervous. Blood pressure was systolic 130, diastolic 100.

January 19, she was enjoying good health and was discharged without hiccoughs.

January 24, she was readmitted to the hospital, complaining of shortness of breath.

January 26, fluoroscopic examination showed the heart of average size. It had certainly not increased in size perceptibly since the last observation. The diaphragm was high on each side. The respiration was very rapid and forced inspiration seemed impossible. The diaphragm was undergoing short, rapid excursions synchronous with the movements of the abdomen. The thoracic movement was so rapid as to deny positive identification of expiratory efforts.

February 1, the patient was resting quietly with slight increase in respiration.

February 5, the patient was feeling well and was discharged as cured.

August 1, 1931, eight months after the operation, I requested the patient to see me, at which time she maintained a normal weight, had a normal blood pressure with a slight increase in pulse and respiration. Let me quote her own words: "I am feeling better than ever, enjoying good health, and doing all my house work."

August 22, fluoroscopy of the chest showed complete paralysis of the left diaphragm with no excursion on deep inspiration. The left diaphragm sagged into the chest with the patient in the Trendelenburg position. The right diaphragm occupied a normal position, excursion was free, the heart was of average size, and the pulsation rapid.

The operation shows:

(1) The procedure is adaptable to uncomplicated cases of hiccoughs.

(2) Ample inspiration and expiration can be carried on after severance of the phrenic nerves.

(3) The shallow hiccoughs present after phrenicectomy soon subsided.

(4) There are changes in the position of the diaphragm before and after operation.

(5) There is early return to normal of the cardiovascular system.

(6) There is return of function to the right diaphragm seven months after operation.

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VARIOUS USES OF ELECTROSURGERY IN THE TREATMENT OF BRAIN TUMORS*

By ERNEST SACHS, M.D.,
St. Louis, Mo.

Electrosurgery was first tried and introduced into surgery by Kelly about six years ago. When his article appeared, I secured one of the machines then on the market and tried it upon some animals in the laboratory in experiments upon the brain. I abandoned it, however, as I found: (1) that it produced convulsive movements; (2) though it stopped the bleeding of cortical vessels, these were so delicate and friable that they tore very readily. It was only after Cushing's publication in 1928, in which he reported his results with the apparatus devised by Bovie, that I again began to use it. Since April, 1928, I have been using this method, and have found it such an essential and invaluable part of my armamentarium that I will not undertake a cranial operation today unless I have the apparatus at my side.

I do not know enough about electricity to discuss this phase of the subject at any length. There are different types of high frequency current, which are known as damped and undamped currents. The waves of the damped current (*Fig. 1*) vary both in rate and amplitude, while the undamped current (*Fig. 2*) has both a uniform rate and amplitude. This latter type of current, undamped, has the cutting property but, as it does not dehydrate, it lacks the coagulating power which is the essential feature we need. By combining the two types of current and producing a moderately damped wave (*Fig. 3*) or highly damped wave (*Fig. 4*), both the cutting and coagulating features are combined.

Another important feature in using the high frequency current is that the current used must have such a high rate of interruptions that it will not stimulate the nerve cells in the brain and give rise to convulsive seizures, either local or general.

The type of apparatus devised by Bovie delivers currents with these features.

I have visited a number of neurosurgical clinics which had such an electrical unit, but the

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*Read in Section on Neurology and Psychiatry, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

*EDITOR'S NOTE.—Since more than the maximum number of illustrations furnished by the JOURNAL appear in this paper, the cost for the extra illustrations is borne by the essayist.

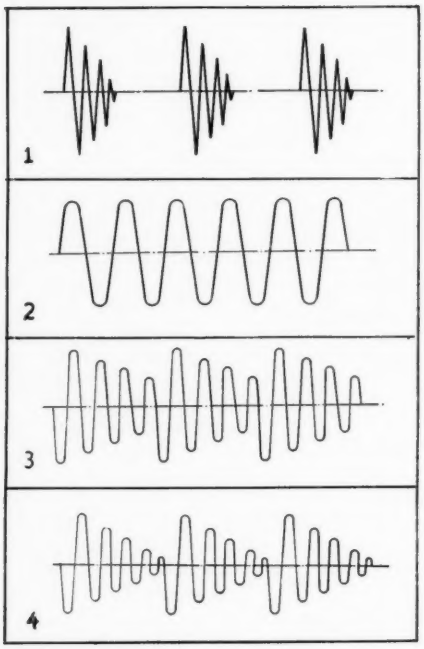

Fig. 1

Damped current showing highly damped waves which have very little cutting power, but marked coagulation and dehydration qualities.

Fig. 2

Undamped current. Cutting current, but no dehydration effect.

Fig. 3

Moderately damped current. As in this type the damped qualities are only moderate, the current cuts more than it dehydrates.

Fig. 4

Markedly damped current. This type of current has both cutting and coagulation features.

apparatus stands in a corner unused, and when I have asked why they do not use it, the answer invariably has been, "It does not work." It takes time to learn any new technical method. Fully six months of almost daily use were required before I learned the possibilities of electrosurgery and how to use it effectively. Today, it is in constant use during an operation after the skin incision has been made with a scalpel. No skin incisions on the head should be made with the current, for, if one uses enough coagulation to stop bleeding from the scalp, the wound will not heal by primary union, and without coagulation the incision can be better made with a knife.

When we first began using this method, the power was turned on by a trigger, attached to the pencil held in the operator's hand. That was found impractical and now the current is turned on or off with a foot switch controlled by an assistant. Two sterile handles have been attached to the machine so that the same assistant can instantly switch the current to and fro from coagulation to cutting (*Fig. 5*).

Kelly, in his original article, pointed out that running a current down a clamp on a vessel that had been cut, coagulated it, so that it did not need to be tied. When one grasps a vessel on the cortex of the brain, even with a very delicate forceps, and coagulates it, the coagulated vessel is very likely to stick to the forceps and when the forceps is removed the vessel tears. It took a long time to overcome this difficulty, but we have solved it and the method we now employ constitutes, I believe, one of the most valuable uses of electrosurgery. The vessel is coagulated before it is cut and it is not grasped at all with an instrument. The vessel is stroked. A small vessel is instantly shriveled up, but a larger vessel only gradually contracts and finally becomes obliterated. To accomplish this, it is very important not to use too strong a current, for, if the current is too strong, the vessel is perforated, and, if it is a large one, a very severe hemorrhage follows. By the proper application of this technic, vessels 3 to 4 mm. in diameter and even larger have been occluded, but it may take several minutes to do this (*Fig. 6*).

Formerly our most effective method, in fact, our only method of occluding vessels in the brain was by means of Cushing silver clips. Today we rarely use one and carry many operations through without the use of a single clip. For-

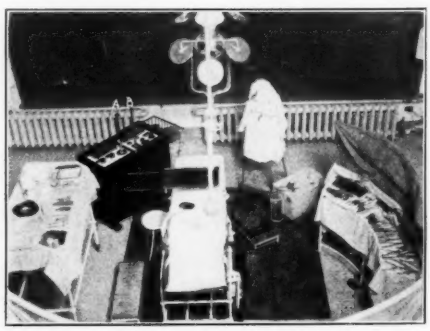

Fig. 5

The Bovie unit is part of the operating room "set up." The long handles (A and B) are sterile and can be manipulated by an assistant.

Fig. 6

This is a drawing of the first arteriovenous aneurysm we removed with electrosurgery. One of the largest vessels ruptured because too strong a current was used. The hemorrhage was controlled with a large piece of muscle. Patient made an uneventful recovery. Operation, January, 1929.

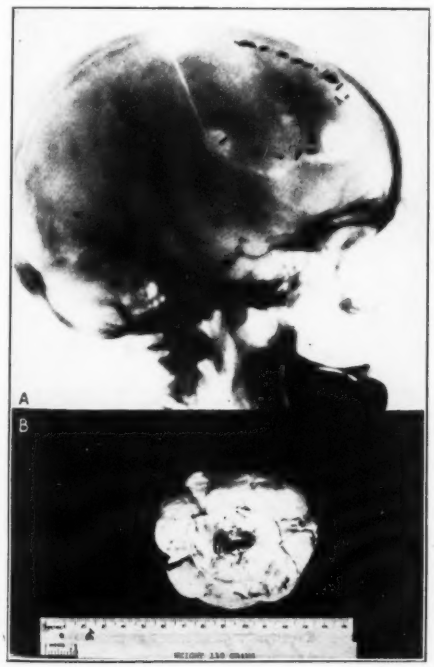

Fig. 7

A. Appearance in the x-ray plate of the operative field after removal of a meningioma. Note the large number of silver clips that were used before the days of electrosurgery. B. The tumor, showing its dural attachment.

merly it was not uncommon to use from 50 to 100 clips (*Figs. 7, 8, 9* and *10*). Small bleeding points on the dura used to take an endless time to stop. Often to stop these bleeders we applied bits of muscle, but today that is no longer needed. It can all be done with the current (*Figs. 11, 12* and *13*).

Angiomas or arteriovenous angiomas of the cortex, which formerly we left severely alone and never dared to touch, can be shriveled with this method, but let me emphasize that it is not a time-saving device, for coagulating such large vessels is tedious and must be done slowly (*Figs. 14, 15* and *16*). The middle meningeal artery in an operation for trigeminal neuralgia we used to control by plugging the foramen spinosum or by tying; now we usually coagulate it before cutting

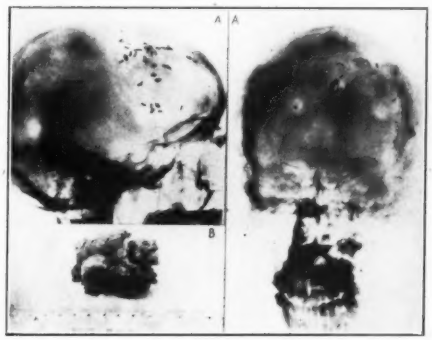

Fig. 8

A. Appearance in the x-ray plate of the operative field after removal of a meningioma attached to the falx. B. Meningioma removed.

Fig. 9

Appearance of postoperative field from which an astrocytoma had been removed. The bulk of the tumor was cystic; the nubbin (B) was rather small.

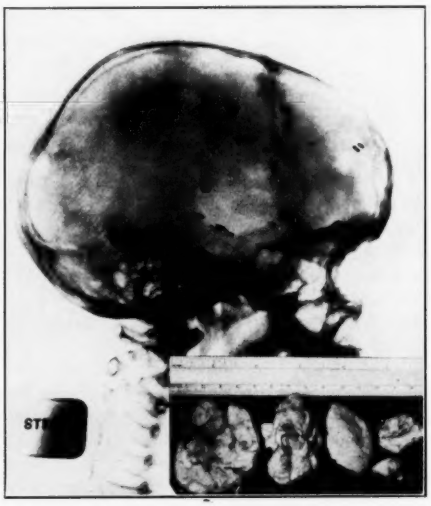

Fig. 10

Ependymoma removed from a young child. It was a well encapsulated tumor, but a great many clips had to be used to control the vessels.

it. When removing a tumor, the vessels around the line of incision are coagulated. Sometimes, of course, vessels are cut and have to be grasped and coagulated, and then one may have the difficulty that the vessel sticks to the forceps. One of the most difficult problems we still have to deal with is the removal of the malignant gliomas, the type known as spongioblastoma multiforme. In their removal one of the problems has been that it has been very difficult, often impossible, after incising the cortex with a knife, to distinguish tumor tissue from normal brain tissue. An incision with the electric knife does not change the gross appearance of brain tissue so that one can recognize the limits of a tumor. With this technic we stand a better chance of radically removing this type of tumor than ever before (*Fig. 17*).

In the past year we have used electrosurgical technic for still another condition. In communicating hydrocephalus I still believe the most promising procedure is the removal of the choroid plexus. The anatomy of the choroid plexus varies greatly. In some cases it is pedunculated with a narrow base and one clip or tie controls the entire blood supply and it is readily removed; but in the great majority of cases there are numerous vessels, twenty or thirty, that run into it from the surface of the thalamus. Such plexuses I speak of as sessile. To tie these vessels or clip them was a formidable procedure and I have lost a number of cases in the past because of hemorrhage from one of them. By running the coagulating current into the plexus without grasping it, the plexus can be readily shriveled and destroyed. At first I feared the heat might give us a thalamic disturbance, but that has not been the case. The coagulated, sometimes slightly charred, plexus is left *in situ*. It has been claimed that leaving slightly charred tissue in a wound is harmful, but I have not found that to be the case, and such carbonized tissue is far less dangerous than traumatized, devitalized brain tissue.

Electrosurgery may also be used to core out

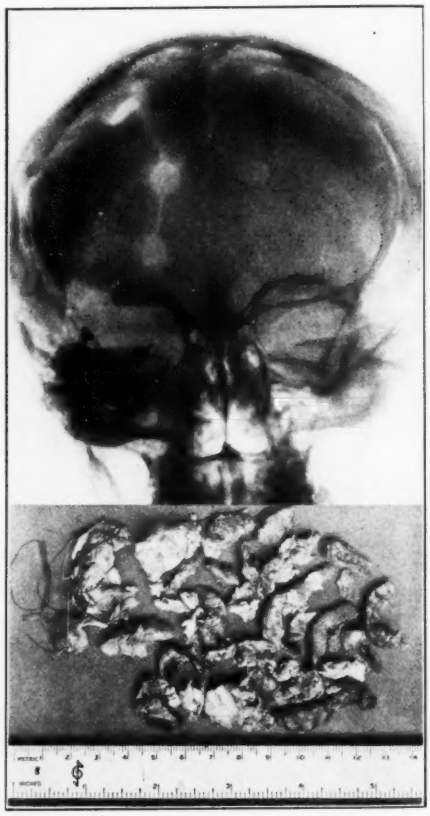

Fig. 11

Meningeal fibroblastoma (40 grams) removed with the electric knife. The tumor grew from the olfactory groove, had grown through the roof of the orbit, and was partly intraorbital. In this case, three or four clips were used in the olfactory groove, but today this probably would not be necessary, as the technic in handling these tumors has improved.

Fig. 12

A. Appearance of operative field after removal of meningioma with electrosurgical technic. This tumor lay on the floor of the middle fossa and was attached to the greater wing of the sphenoid. The base was very broad and huge vessels ran into the tumor. Only one clip was used throughout the operation and this one proved unnecessary, as the vessel was coagulated. B. Tumor removed piece-meal, cored out with loop.

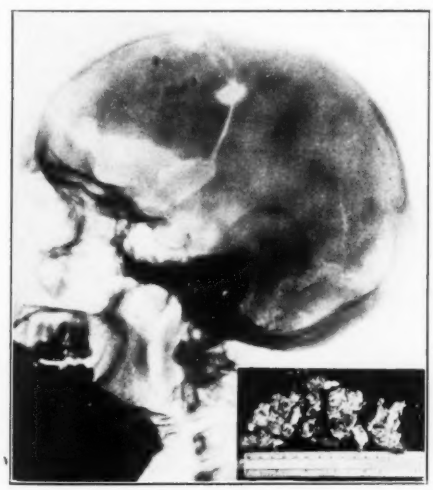

Fig. 13

An oligodendroglioma lying along the falx and extending down to the ventricle. Very vascular. Only two clips had to be used in the entire procedure.

the center of large tumors, such as meningiomas, and collapsing them, leaving a shell or capsule (*Fig. 11*). In this way large tumors may be removed through smaller openings without compressing the surrounding brain tissue so much as was necessary if the entire tumor were removed in one mass. This use of electrosurgery was particularly emphasized by Cushing in his early paper on the subject and, though it is invaluable, I have found the other uses even greater.

One of the questions that has been asked repeatedly is: "Does not secondary hemorrhage occur much more frequently with electrosurgery?"

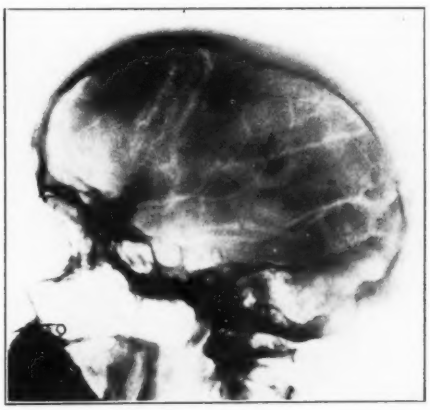

Fig. 14

X-ray appearance of arteriovenous aneurysm. The tortuous, partially calcified vessels can be clearly seen.

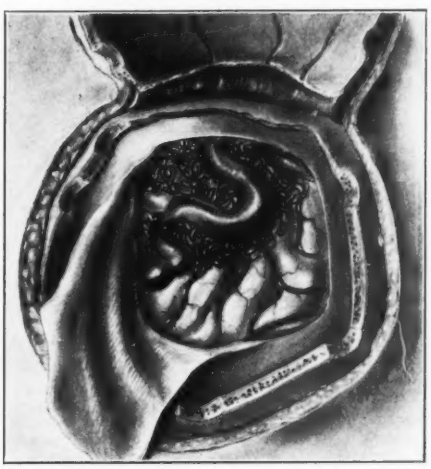

Fig. 15

Drawing of arteriovenous aneurysm seen in x-ray plate in Fig. 14.

I have used the method now for over three years in several hundred cases and I am confident that it does not. There are tricks in every trade. When a large vessel is coagulated it must be shriveled for quite a distance, 4 or 5 mm. at least, otherwise the plug might be blown out.

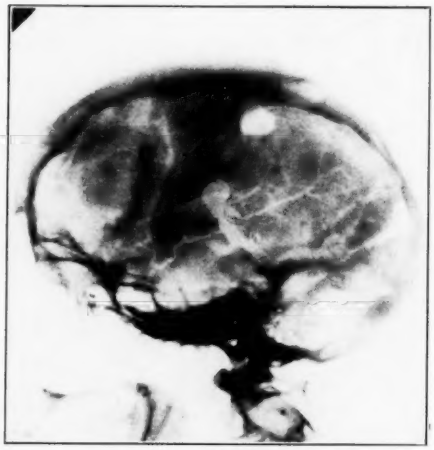

Fig. 16
X-ray film after operation showing that no silver clips were used throughout this procedure.

Fig. 17
Very vascular subcortical spongioblastoma multiforme. Weight 87 grams. Formerly there would have been countless silver clips used, while today the few clips shown in the picture could probably have been dispensed with and the vessels might have been controlled if a spraying current had been used.

There are many other details of using this method which can be learned only at the operating table.

Electrosurgery, in my opinion, is the most important technical advance in neurosurgery that we have had in years. It has made it possible to attack and remove tumors that formerly I would not have dared attempt to remove, and it has made all removals of tumors easier.

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DISCUSSION (*Abstract*)

Dr. J. G. Lyerly, Richmond, Va.—My experience with electrosurgery has been slightly less encouraging than that of Dr. Sachs, probably due to the fact that we have made more limited use of it. For certain encapsulated tumors on the surface of the brain, as the meningioma, with its attachment in the region of the longitudinal sinus, it has been used only in sealing off some of the smaller superficial vessels. The deeper and more inaccessible bleeding points have been controlled with muscle grafts. The infiltrating tumors, however, such as spongioblastomas, unless they are too vascular, can be more completely removed by cutting out bits of tumor with the electric loop. There is no doubt that we are obtaining better results now than we did in the beginning, probably from added experience in its use.

Dr. Temple Fay, Philadelphia, Pa.—Dr. Sachs has emphasized an important adjunct to our methods of attack upon cerebral tumors. His suggestion of coagulation of the large veins by repeated stroking is important.

In my experience the use of the loop for taking out tumors with a cutting current has not been so satisfactory as the removal of the tumor mass by suction. The vascular tree may be carefully isolated by suction, so that irregular extension of the tumor tissue along these paths into normal brain substance may be detected and removed. The electrocauterization of any suspected areas should follow and this combined method has given very satisfactory results. The loop method, when dealing with gliomata, frequently cuts away normal and diseased brain, at the same time making the line of demarcation difficult to follow.

Dr. Edgar F. Fincher, Jr., Atlanta, Ga.—In the treatment of Jacksonian epilepsy in which the lesion is only demonstrable after stimulating the epileptic zone, it has been our practice to destroy this cortical area by the injection of alcohol. The injection of alcohol into the cortex brings the danger of subsequent scar formation, and for this reason electrocoagulation of the cortex has been substituted. Coagulation brings about deeper destruction than was possible with alcohol and our results to date have been more satisfactory.

Another use of the electrosurgical unit has been in the treatment of brain abscesses. After turning down a bone flap, anticipating a cerebral neoplasm, the intro-

duction of a brain cannula may prove the lesion to be an abscess. Using the coagulating bulb, the dura may then be sealed to the arachnoid and subsequently to the underlying cortex. Thus artificial adhesions are immediately produced, which permit opening the abscess without infecting the remaining tissue. We have treated 3 such cases in this manner successfully.

Dr. Sachs (closing).—Regarding Dr. Lyerly's question: in tumors that lie along the longitudinal sinus I have found electric coagulation of great value. Where there are numerous veins running into the sinus, as one encounters in the supratentorial approach to a cerebellar lesion over the occipital lobe, a great deal of time is saved by coagulating each vein before cutting it. Sometimes there are as many as twenty veins running from the occipital lobe into the sinus, and to tie these doubly or clip them, as we used to do, is not nearly so satisfactory as the method we now use.

Regarding Dr. Fay's point, of course I do not want to be understood as having given up all other technical methods for electric coagulation. Suction has been an essential part of our technic for at least the last five years, and occasionally we still are obliged to resort to a silver clip. At times, in a difficult case, every trick that a surgeon knows may be called into use. Electric coagulation has made it possible to remove tumors which it was impossible to remove by the older methods.

The case was mentioned in which a silver clip slipped down the canal several years after a cerebellar tumor had been removed. It is amusing in retrospect, but at the time it caused me much worry, since it might have made a fine basis for a damage suit. At that time one neurosurgeon who heard of my experience carried out some experiments to try to invent an invisible clip.

Dr. Fincher's point of using electric coagulation for focal epilepsy is very interesting. I have never tried it, but I certainly shall since he reports such good results. In the past I have always done a subpial resection of the cortex in focal epilepsies.

TREATMENT OF LUNG ABSCESS BY BRONCHOSCOPIC DRAINAGE*

By HAROLD LESLIE KEARNEY, M.D.,
New Orleans, La.

In this brief discussion I wish to mention the most salient features of lung abscess.

The lungs have a peculiar power of ridding themselves of atmospheric dust and of pathological secretions by the defensive mechanism of cough and ciliary wafting. Cough serves not only to carry foreign material out by the blast of air, but by the compression of the lung and physiologic narrowing of the bronchi which take place during expiration, actually squeezes up material from the deeper bronchi and the sponge-like lung. The cilia of the ciliated epithelium lining the tracheobronchial tree are continually wafting upward and assist in keeping the lungs free of dust particles from above and excessive secretions from below.

Chevalier Jackson has expressed the opinion that the fundamental factor in all pathologic conditions of the lung is impairment of the defensive power of the lung due to impairment of drainage and aeration. Failure of either the cough reflex or the ciliary action is an important factor in the etiology of suppurative disease of the lung.

In lung abscess there is a single focus or sometimes multiple foci of suppuration within the lung. This condition may affect any lobe of either lung. It may be centrally located and communicate with a bronchus. It may be peripherally located in proximity to the pleura, where it has little chance of adequate drainage through the bronchial tree and an excellent opportunity of rupturing into the pleural sac and complicating the condition with an empyema. In general, the first type of case is most favorably situated and the second type of case is least favorably situated for bronchoscopic drainage.

It has been variously estimated that from 10 to 25 per cent of cases of lung abscess heal spontaneously, due to this mechanism of cough and ciliary wafting assisting the natural defensive forces in their fight against the infection. In other cases cough and ciliary wafting are not sufficient to free the lung of the products of inflammation and 50 to 70 per cent of untreated cases of lung abscess die. A variable percentage of cases will be cured by any of the methods of treatment and a certain number of cases will die despite all treatment.

In lung abscess the treatment may be surgical, postural or by bronchoscopic drainage. Probably the great majority of lung abscesses are curable by bronchoscopic drainage if the treatment is instituted early. A lung abscess that has existed for eight weeks may be considered chronic. We have no means of knowing which cases will heal spontaneously and are no safer in following expectant treatment in abscess of the lung than in acute appendicitis. The earlier bronchoscopic treatment is instituted in lung abscess the more favorable will be the outlook.

Bronchoscopic drainage, done under local anesthesia, is advisable: (1) in acute abscesses which do not drain promptly and become quickly afebrile with posture; (2) in cases in which the

*Read in General Clinical Session, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

location of the abscess is not near the periphery; and (3) in chronic cases where it may be the curative agent or where it may be used as an accessory to medical or surgical measures. Post-tonsillectomic lung abscesses usually respond very favorably to bronchoscopic drainage if the treatment is instituted early. Lung abscesses resulting from foreign body usually heal rapidly after bronchoscopic removal of the foreign body. Chronic abscess of the lung does not respond so rapidly as acute lung abscess, but patience on the part of physician and patient may be rewarded, as numbers of patients have been cured

Fig. 1-a
Before removal of foreign body.

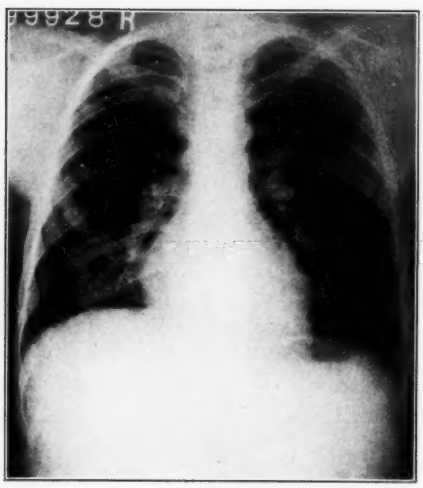

Fig. 1-b
After removal of foreign body.

Master B. (Figs. 1-a and 1-b), boy, 14 years of age, with chronic abscess middle lobe, right lung, secondary to foreign body aspirated three years before. Very thin, sick, and poorly nourished. Well and fat in thirty days after removal, which was done by fluoroscopic bronchoscopy because foreign body was hidden from view through the bronchoscope by granulation tissue and a stricture of the bronchus.

Fig. 2-a
Before bronchoscopic treatments.

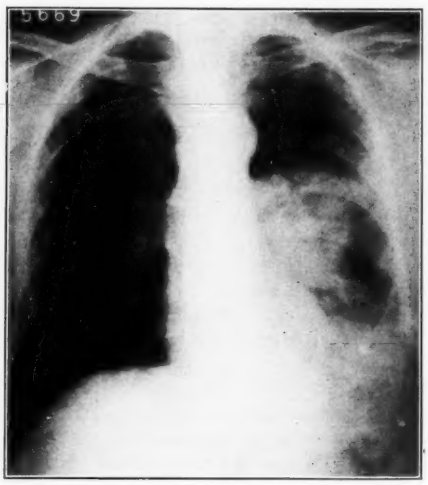

Fig. 2-b
After bronchoscopic treatments.

after frequent bronchoscopies extending over a period of many months. In chronic lung abscess or in bronchiectasis with profuse foul expectoration, the patient is a social outcast and will usually continue under treatment for the relief afforded him from the distressing symptoms even when prospect of cure is remote. The foul odor from lung abscess usually clears up after a few bronchoscopic aspirations.

Many patients for whom bronchoscopy would be life saving are being deprived of its benefits by the unreasoning fear that bronchoscopy is an excessively dangerous procedure. Bronchoscopy

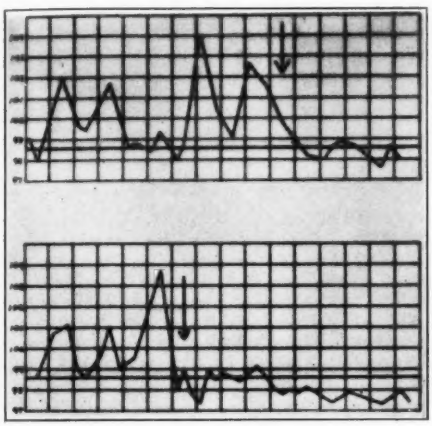

Fig. 2-c
Fever chart. Arrows indicate bronchoscopic aspiration.

Mr. D. (Figs. 2-a, 2-b, and 2-c), age 60, had arsphenamine dermatitis, osteomyelitis of right leg and acute abscess of lower lobe of left lung. Three bronchoscopies resulted in cure of the lung abscess. See fever chart.

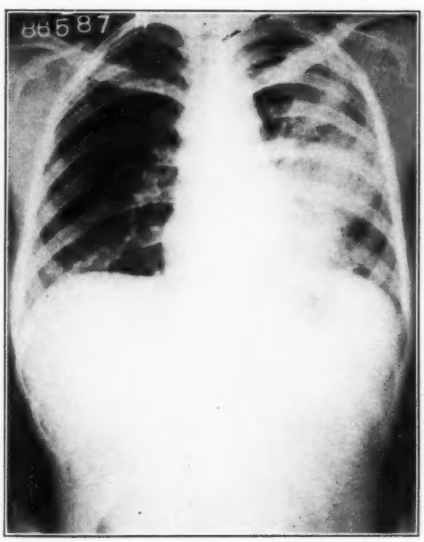

Fig. 3-a
Before bronchoscopic treatments.

Fig. 3-b
After bronchoscopic treatments.

Miss McD. (Figs. 3-a and 3-b), age 21, had chronic post-tonsillectomy abscess of upper lobe, left lung, seven months' duration before bronchoscopic drainage. Weighed 80 pounds at one time. Well after eighteen bronchoscopic drainages and weight increased to 135 pounds.

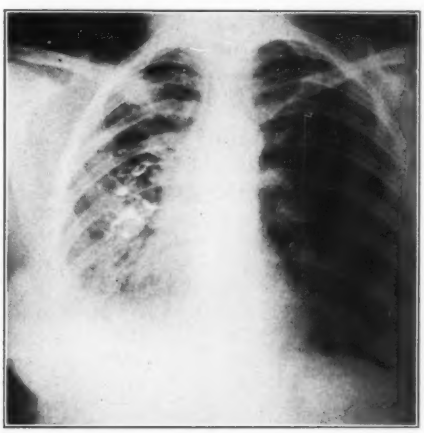

Fig. 4

Mrs. B., age 32, had bronchography with lipiodol. Chronic post-tonsillectomy abscess of middle lobe of right lung. Had had empyema after artificial pneumothorax. Thoracotomy. First bronchoscopic drainage after abscess had existed for 18 months. Patient made comfortable by bronchoscopic aspiration, gained weight to 150 pounds, and felt well physically, but was not cured. Refused surgical aid. Note extensive bronchiectasis which develops in long-standing chronic lung abscess.

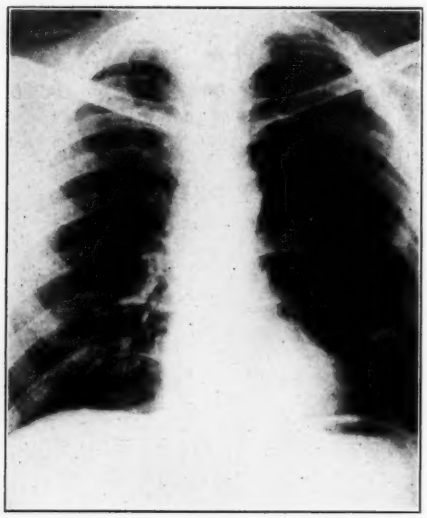

Fig. 5
Mr. McC., age 40, had acute post-influenzal abscess of left lower lobe. Well after three bronchoscopic drainages.

per se, when done by a properly trained and equipped bronchoscopist, is without mortality. I have had ambulant patients have therapeutic bronchoscopy done in the morning and go to work in the afternoon. I have had patients whom I have discharged come back with the request that another bronchoscopy be done for fear the condition would return.

Herman J. Moersch reports 105 cases of lung abscess treated bronchoscopically in five years at the Mayo Clinic. Of the 105 patients, the following is an analysis: cured, 51; improved, 18; unimproved, 23; questionable, 7; and died, 6.

In the past four years I have treated eight cases of abscess of the lung by bronchoscopic aspiration. Of these, six recovered, one improved, and one died.

Bronchoscopic drainage under local anesthesia is an exceedingly valuable procedure in the treatment of lung abscess and should be used extensively in the management of these cases.

MADURA FOOT IN THE UNITED STATES*

By PAUL BRINDLEY, M.D.,
Galveston, Texas,
and
W. L. HOWELL, M.D.,
Rochester, Minn.

Boyd and Crutchfield,[1] in 1921, reviewed the status of mycetoma as it had been recognized in North America. At that time 13 cases had been reported in the United States. To their list 12 cases have since been added: 3 by Pagenstecher[2] of San Antonio; 4 by Hammack and Lovejoy[3] of Los Angeles; 1 by Gammel, Miskjian and Thatcher[4] of Cleveland; and 1 each by Harold[5] of Macon, Georgia, Halloran[6] of Los Angeles, Thompson and Ikeda[7] of Minneapolis, and Gay and Bigelow[8] of Holyoke, Massachusetts. Through the courtesy of Dr. G. A. Pagenstecher, of San Antonio, and Dr. Hendery Allison, of Kingville, Texas, both of whom have previously reported cases,[9] and Drs. Dudgeon and Klatt, of Waco, we are able to add 3 new cases to this series. It is our purpose to summarize briefly the epidemiology, onset and course of this total of 28 cases, and in addition to give the gross and microscopic lesions of the disease as seen in the 6 specimens now present in the pathological museums of the University of Texas.

Case 1 (No. 26 in whole series) is that of a negro man, age 38, who was admitted to Dr. Pagenstecher's service at the Robert B. Green Memorial Hospital in San Antonio on June 10, 1924. The patient was a cook and had been traveling with a show. He stated that eight weeks previously he had burned his foot,

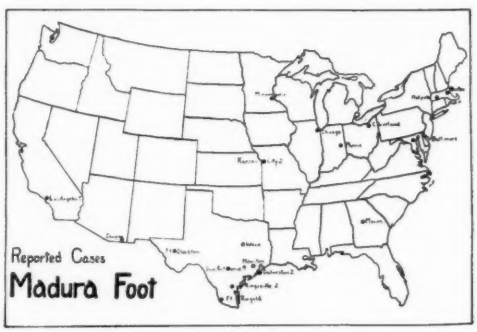

Fig. 1
Location of twenty-eight reported cases of madura foot in the United States.

*Read in Section on Pathology, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

*From the Department of Pathology, School of Medicine, University of Texas.

Fig. 2
Case 1. Foot showing swelling, sinuses and pigmentation.

apparently a second or third degree burn. This healed in about three weeks. Soon afterwards his foot began to swell and small blisters appeared on the surface, these later breaking down and discharging a pus-like substance. The swelling and areas of discharge progressively increased. There was some pain, although this was never severe.

The past history showed measles, mumps, and pertussis as a child, typhoid fever at 13, and one attack of gonorrhea.

Physical examination was negative except for the changes in the right foot. This was greatly swollen, indurated and pierced by multiple sinuses which discharged a flaky, pus-like substance. Several small scars indicated where older sinuses had healed.

X-ray examination showed early bony changes in the os calcis and a periostitis of the lower end of the fibula.

Urinalysis was negative. A count of the white blood cells showed 8,800 with 69 per cent polymorphonuclears, 22 per cent small lymphocytes, 4 per cent large mononuclears, 3 per cent transitionals, and 2 per cent eosinophils. The blood Wassermann was four-plus.

Microscopic examination of the small bodies found in the discharge from the sinuses showed a "typical clear zone with branching mycelial threads arranged about the periphery."

Amputation was performed at the junction of the middle and lower thirds of the leg, with satisfactory recovery.

Case 2 (No. 27 in whole series) occurred in a Mexican woman, age 58, who came to Dr. H. R. Dudgeon, of Waco, in March, 1931. A native of Mexico, she had moved to Texas 13 years previously, where she has since resided. Eight years ago a small nodule appeared on the dorsum of the foot. This broke down and discharged pus in which "many little yellow balls" were noticed by the patient. More sinuses appeared and although some of them healed, the total number gradually increased. She had been unable to walk on the foot for the last five years. However, the condition caused no pain and her general health was good. There was no history of trauma prior to the onset of the disease.

Physical examination showed a we'l nourished, middle aged Mexican woman. Thoracic, abdominal and pelvic examinations were negative. The left foot was swollen to three times the normal size, with the swelling extending a short distance above the ankle. Numerous discharging sinuses were present. The left inguinal lymph nodes were slightly swollen but painless.

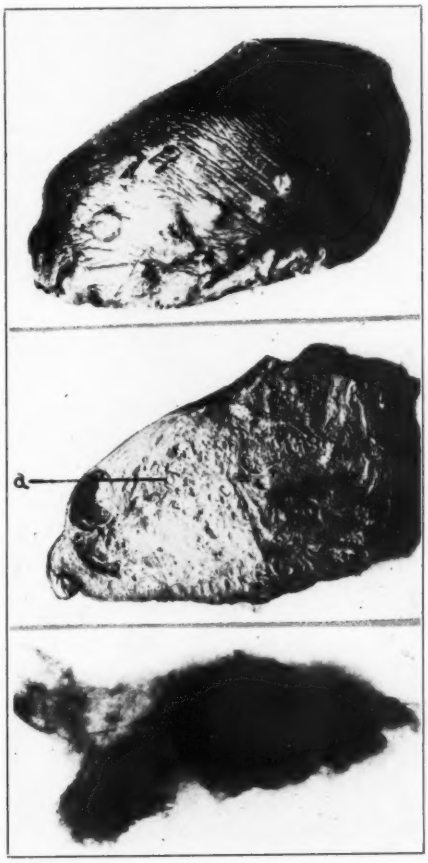

Fig. 3 (top)—Case 2. Amputated foot showing swelling, nodules, and sinuses.

Fig. 4 (center)—Case 2. Section of foot showing subcutaneous abscesses and the extensive destructive processes. At "a" is seen a granule in one of the numerous sinuses.

Fig. 5 (bottom)—Case 2. X-ray showing extensive bony erosion.

X-ray examination showed extensive bony destruction.

Following amputation the patient made an uneventful recovery.

Case 3 (No. 28 in whole series) was recognized by Dr. Hendery Allison, of Kingsville, and confirmed by laboratory examination. It occurred in a Mexican woman aged 30. Having begun twelve years previously as a nodule on the right heel, the condition had progressed until at the time of removal the foot was greatly enlarged with the ankle also involved. Following amputation the patient gained in weight and strength and, as far as we have been able to determine, has made an uneventful recovery.

A study of the epidemiology of these 28 cases listed in *Table 1* reveals the fact that 12 were recognized in Texas, 5 in Los Angeles, 1 in Arizona, and 1 in Georgia; or, in other words, 19 out of the 28 occurred in a semitropical climate. Twenty-three cases were in males and only 5 in females. Six occurred in whites, 7 in negroes, and 15 in Mexicans. The average age of this group was 34 years, the youngest being 7 and the oldest 77. It is interesting to note that three-fourths of the cases appeared between the ages of 10 and 40, and 17 in the third and fourth decades.

Fig. 6 (top)—Case 3. Showing swelling, nodules, sinuses and pigmentary changes.

Fig. 7 (center)—Case 3. Photomicrograph of a granule as seen on section, showing mass of mycelial filaments with radial arrangement at periphery.

Fig. 8 (bottom)—Photomicrograph, high power of Fig. 7, showing radiating filaments.

Nineteen patients were laborers who probably spent most of their time out-of-doors. Four were housewives, one a cook, one a dental student, and one a dry goods clerk. In one report the occupation was not mentioned. Of the 19 laborers, 8 were farm hands and 1 a rancher.

Sixteen of the series gave a history of previous trauma. Eleven of these were contused wounds, 4 puncture wounds, and 1 a burn. Seven definitely stated that there had been no previous trauma while 5 did not allude to it.

Swelling and nodule formation were the first changes noted by most of the patients, each being mentioned in 9 cases. In 3 pustules, and in 2 pain was the first feature noted. Dark pigmentation of the skin was the first noticeable feature in 1 case. In 4 cases the character of onset was not mentioned. The progress in 21 cases was said to have been slow, in 6 cases moderate, and in 1 case it was mentioned as being rapid. The average duration of the disease was six years and eight months in the series. It caused no fever and little impairment of the general health. In every instance the foot was swollen, usually to a marked degree. Three-fourths of the patients complained of pain which was usually only moderate or slight. Over half of them were still using the foot in walking when the physician was first consulted.

Grossly in the six specimens of this condition we have examined, the foot is swollen, being enlarged from one-half to three times the normal size. Characteristically this swelling is in all dimensions so that the foot takes on a somewhat ham-like appearance. The vertical thickness is greatly increased with the sole of the foot becoming convex in outline, this resulting in the toes being elevated from 1 to 3 cm. above the lowest portion of the sole. The toes are not spread apart by the tumefaction and appear relatively smaller than normal.

A variable number of papular elevations are seen involving the foot, these being more numerous on the sides and dorsum than upon the sole.

About half of these nodules are pierced by sinuses, while the others are either firm or fluctuant on palpation. Ranging from 5 to 15 mm. in diameter, some of them are flattened over the surface, others rounded. Incising the fluctuant nodules discloses a sero-purulent or gelatinous material in which one or more small greyish granules can usually be made out.

Irregularities of pigmentation are present in most cases, the foot generally having a somewhat mottled appearance. In most instances the pigment is deficient about the sinuses and over the nodules for a distance of 2 to 5 mm., while about such areas are zones of hyperpigmentation. A variable number of small, rather smooth or depressed patches of depigmented skin represent sinuses which have healed.

On sectioning the foot the course of the sinuses can be made out as they penetrate deeply and seemingly pass through bony and tendinous structures almost as readily as through the softer muscles and connective tissues. No tissue is spared and in some cases the foot is so riddled with intercommunicating sinuses as to have a honeycombed appearance. In one instance the bony destruction is so extensive that the sectioning knife cuts through the entire foot without the necessity of using a saw. Most of the sinuses are filled with sero-purulent material, but a few contain a more greyish, translucent, syrupy substance. Granules in variable numbers are seen in this exudate and are found lodged in sinuses from which the puriform material has drained. All these granules show irregular, mulberry-like surfaces and are of a greyish or slightly yellow color, resembling the color of fat tissue. They vary from 1 to 6 mm. in diameter. In one case there is a subcutaneous abscess measuring 2.5 cm. across, but the average size of the sinuses range from 1 to 3 mm. Heavy interlacing bands of scar tissue are present, and these with the fascial and tendinous structures have a peculiar bluish, translucent appearance which is due apparently to a hyaline change.

Microscopic.—The epidermis is irregularly thinned over the nodules, but in other areas shows hypertrophic changes with considerable

Table 1

Case No.	Reporter	Year	Place Recognized	Sex	Race	Age at Onset	Previous Trauma	Duration
1	Kemper and Jameson	1876	Muncie, Ind.	M	W	24		Six months
2	Hyde et al	1896	Chicago, Ill.	M	W	7		Three years
3	Pope and Lamb	1896	Fort Stockton, Tex.	M	M	19		Eight years
4	J. H. Wright	1898	Boston, Mass.	F	M	25		Six months
5	Arwine and Lamb	1899	Fort Ringold, Tex.	M	M	43		Two years
6	Allison	1913	Kingsville, Tex.	M	M	77	X	Seven years
7	Sutton	1913	Kansas City	M	M	21	X	Three years
8	Sutton	1913	Kansas City	F	M	12	X	Eleven years
9	Winslow	1917	Baltimore, Md.	M	N	18	X	Three years
10	Boyd and Crutchfield	1921	Galveston, Tex.	M	N	18	X	Five years
11	Boyd and Crutchfield	1921	Galveston, Tex.	M	N	22	X	Twelve years
12	Boyd and Crutchfield	1921	Douglas, Ariz.	M	M	40	X	Eighteen months
13	Kirkham	1921	Houston, Tex.	M	M	11	X	Eleven years
14	Pagenstecher	1922	San Antonio, Tex.	M	W	54	X	Four years
15	Pagenstecher	1922	San Antonio, Tex.	M	M	27	X	Seventeen years
16	Pagenstecher	1924	San Antonio, Tex.	F	M	26	X	Ten years
17	Lovejoy and Hammack	1925	Los Angeles, Calif.	M	M	32	—	A few months
18	Lovejoy and Hammack	1925	Los Angeles, Calif.	M	M	32	—	
19	Lovejoy and Hammack	1925	Los Angeles, Calif.	M	M		X	
20	Lovejoy and Hammack	1925	Los Angeles, Calif.	M	M	41	X	Five years
21	Gammel et al	1926	Cleveland, Ohio	M	M	21	—	Five years
22	Harrold	1927	Macon, Ga.	M	N	39	—	Three years
23	Halloran	1927	Los Angeles, Calif.	M	N	52	—	Four years
24	Thompson and Ikeda	1928	Minneapolis, Minn.	M	N	29	X	Ten years
25	Gay and Bigelow	1930	Holyoke, Mass.	M	W	33	X	Ten years
26	Brindley and Howell	1931	San Antonio, Tex.	M	N	38	X	Eight months
27	Brindley and Howell	1931	Waco, Tex.	F	M	58	—	Eight years
28	Brindley and Howell	1931	Kingsville, Tex.	F	M	18	—	Fifteen years

distortion of the interpapillary epithelial downgrowths. Inflammatory cells, the majority of which are mononuclears, infiltrate the corium. This may be loose and cellular and contain numerous small blood vessels or be more dense and show hyaline changes. Those nodules not pierced by sinuses show either an increase of connective tissue with round cell infiltration or a collection of pus. The nodules through which the sinuses pass are infiltrated with polymorphonuclears, while the exudate which is still present in some of these sinuses consists of necrotic inflammatory cells chiefly polymorphonuclears and lymphocytes. It is in this purulent material within the sinuses that the causative organisms are seen.

Passing more deeply, we see an increase of fibrous tissue, this varying in character from a loose cellular type along some of the sinuses to other areas where there is older scar tissue showing hyaline changes. The tissues are infiltrated with various types of cells, particularly along the walls of the sinuses. Polymorphonuclears, lymphoid and plasma cells are numerous. Macrophages, apparently endothelial in character, are a prominent feature in half the cases. These cells contain granules of pigment, debris and lipoids, some of them being greatly distended with this material. In three of the six cases giant cells are found. In one case there are numerous smaller giant cells containing 3 to 8 centrally placed nuclei. In other cases the giant cells are larger with 20 to 30 nuclei irregularly arranged. Granules of golden brown blood pigment are seen scattered about the inflammatory areas.

Typically the clumps of organisms are surrounded by a variable amount of pus, while outside this zone the living tissue is infiltrated with the different types of cells mentioned above, and contains numerous small blood vessels. Older fibrous tissue showing hyaline changes often surrounds such areas. Most of the larger blood vessels present the picture of a chronic arteritis with their lumen diminished in size.

The causative organisms are seen in the center of purulent collections where they appear as larger and smaller tangled masses of mycelial filaments. The smallest of these masses measures about 200 microns in diameter, the largest 3 to 4 mm. In ordinary hematoxylin and eosin stained sections the central portions of these collections stain basically, while the peripheral portion of most of them presents a pink-staining fringe of radially arranged filaments. In only one of our specimens are these radial filaments definitely club-shaped. In the larger granules the more central portion of the growth may stain a somewhat lighter blue than does that nearer the periphery. This is apparently due to a degenerative change occurring in the center of the mycelial mass. The organisms give a variable reaction to the gram stain. Russel-fuchsin bodies are seen in sections stained by Mallory's method.

In reviewing the findings in these cases it is interesting to note the four-plus Wassermann in Dr. Pagenstecher's case. The significance of this finding is not definite, although it probably indicates a luetic infection in addition to the maduromycosis. In all cases the course of the disease was slowly progressive, the defensive forces of the body being unable to cope with the infection. In general the most satisfactory treatment was amputation, this procedure offering a good prognosis.

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910 Avenue B

DISCUSSION (*Abstract*)

Dr. Harvey S. Thatcher, Little Rock, Ark.—Dr. Brindley quoted one of our cases. The patient was a native of Texas, who left his native State and came to us. The diagnosis of the "black foot" variety of Madura foot was easily made. At that time there were only two similar cases reported in this country. Prof. Brump, of the University of Paris, confirmed our studies. We called the new organism Madurella americana. We tried to recover the organism by injecting it into 35 animals by the principle methods, but were unsuccessful. We used rabbits, white mice, white rats, monkeys, pigeons and guinea pigs. We did not continue our studies of this patient, as he left the hospital without giving his address.

Dr. May Owen, Fort Worth, Tex.—The organisms found in these cases, shown by photomicrographs, appear to be the same in all except the first case. In this instance the organism is round and brown as are the

organisms found in chromoblastomycosis. There is also an abundance of giant cells in chromoblastomycosis and the lesions produced closely resemble those of Madura foot.

Dr. J. C. Norris, Atlanta, Ga.—We have a case in Atlanta similar to the one that Dr. Brindley has described, but the patient had never been out of the States of Georgia and South Carolina. In this man's foot we found an organism similar to trichoma.

Dr. J. W. Williams, New Orleans, La.—In *coccidioides immitis* lesions the spherical organism is found in the lesion and the mycelia only on the culture media. The disease may remain localized for a variable length of time. It is possible that the nodular, necrotic, suppurative lesion caused by this organism might on gross examination be mistaken for Madura foot. There are less than 100 cases of the disease reported, by far the largest majority in California.

Dr. Brindley (closing).—I can give little definite information as to the best method of securing the organisms for cultures since most of the specimens from these cases reached our laboratory preserved in formalin. However, Drs. Boyd and Crutchfield were able to secure granules from their case by irrigating the sinuses, even though the patient himself had noticed no granules in the twelve years he had had the condition.

There seem to be many cultural and morphological differences in the various organisms producing the lesions of Madura foot. The exciting agent in the case of Boyd and Crutchfield was a new form, first described by them.

THROMBOPENIC PURPURA HEMORRHAGICA*

REPORT OF UNUSUAL CASE

By Lon Grove, M.D.,
and
J. M. Monfort, M.D.,
Atlanta, Ga.

Idiopathic thrombopenic purpura is descriptive of a disease characterized by pathological bleeding, associated with a great reduction or absence of blood platelets. The disease was first accurately described by Werlhof in 1735. Denhys (1887) is credited with being the first to note the absence of platelets, while Duke first called attention to the prolonged bleeding time.

Etiology.—The etiology of thrombopenic purpura is a much-debated question and the definite cause is still unknown. The primary cause may be an infection, a toxin or a poison which affects the reticulo-endothelial system, or, on the other hand, it may be due to some bone marrow abnormality.

Pathology.—The exact pathology is likewise not well understood. Frank[1] believes that the tendency and ability of the damaged megalocaryocytes of the bone marrow to form blood platelets is greatly reduced in thrombopenic purpura and calls this myelotoxicosis. He states that since it is assumed that platelets arise from the megalocaryocytes of the bone marrow it appears that the scarcity of platelets in this disease indicates that the bone marrow giant cells participate in the disappearance of the platelets, or that they are suppressed due to proliferation of the young cells, the myeloblasts and lymphoblasts. In support of the theory of thrombopenia due to suppression of the platelet-forming tissue of the bone marrow is the case of acute megablastic erythemia associated with purpura hemorrhagica reported in 1927 by Omedei-Zoroni. In this case the disease ran an acute course with marked peripheral megoblastosis associated with a typical clinical purpura hemorrhagica. He concludes that the megaloblastosis and the purpura were caused by the same unknown toxic virus which acted upon the blood platelet-forming tissue and the vascular capillaries.

Ohnesorge believes that a pregnancy toxicosis may be the exciting cause of hemorrhage in a constitutionally pre-existing thrombopenic purpura which previously had given no symptoms. He reports a case of a woman who had profuse vaginal hemorrhage a few days prior to parturition, which continued after a macerated fetus was delivered. A hysterectomy was performed and the platelets rose from 37,000 to normal in four days after operation with a simultaneous disappearing hemorrhagic diathesis. He believes further that the thrombopenia is purely a secondary transitory factor and disappears soon after the removal of the cause, i. e., after the confinement. Four other similar cases were reported in the literature by Lehfeldt,[9] Broich, Holler and Seitz-Hatsch. Leo Breda,[2] in considering the role of pregnancy in this disease, comes to the conclusion that in pregnancy a condition arises which causes certain changes in the capillaries and as the result of this damage hemorrhages may arise.

Kaznelson,[3] who first advocated and performed splenectomy for this condition in 1916, believes that the platelets are destroyed by the spleen and that this thrombolytic function is assumed by the lymph glands, bone marrow and liver after the splenectomy. The plausibility of the above view has been confirmed by the sur-

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prising results of splenectomy. He agrees with Hayem that platelets contain a ferment, retractin, which causes the blood coagulum to contract. Thus, because of the diminished platelets in thrombopenia, there is found an absence of retraction of the blood clot. E. Glandsman,[4] after an exhaustive study of the blood pathology, concludes that in this disease, which he terms hereditary hemorrhagic thrombo-asthenia, a functional inefficiency of the blood platelets exists, which conditions this hemorrhagic diathesis. He was unable to find any anatomical basis for the change in the vessels, and thus assumed that the changes were in the blood itself.

The present consensus of opinion by the majority of workers is that the platelets are formed in normal numbers and are destroyed by the reticulo-endothelial system, chiefly the spleen, and that the capillaries are damaged by a toxin causing them to become more permeable.

Symptoms.—The disease usually manifests itself as an acute fulminating or chronic type. It occurs in women and men in a ratio of about two to one and is most often encountered in early life. Rankin[5] has shown that the result of splenectomy is possibly better when done in childhood before the bone marrow and other blood-forming organs have been too depleted. The diagnosis is usually made by a carefully taken history, supplemented by the characteristic blood findings. There is a history of bleeding over a number of years usually in the female, characterized by repeated nose bleeds, hemorrhages from the mucous membrane, excessive menstruation, recurrent petechia and ecchymotic spots in the skin. The blood usually shows a normal coagulation time, prolonged bleeding with non-contractility of the clot, a reduction of blood platelets below 100,000 cu. mm. and frequently the picture of secondary anemia. The spleen may or may not be enlarged. Kaznelson noted a splenomegaly in most of his cases, but this is by no means a constant finding, and frequently the spleen cannot be palpated.

The differential diagnosis should be carefully made between this condition and the symptomatic purpuras as seen in sepsis, leucemia, pernicious anemia and aplastic anemia. In addition to the characteristic blood picture, a new test has been suggested in differentiating between pernicious anemia, thrombopenic purpura and aplastic anemia. If a few minims of adrenalin is given, the platelet count will quickly rise to normal in pernicious anemia, while in thrombopenic purpura there will be only a slight increase and in aplastic anemia no appreciable increase will occur.

Treatment.—In the light of the report of comparatively large series of cases, notably those of Mayo Clinic, 41 cases by Pemberton,[7] 72 cases by Whipple and a review of 101 cases by Spencer,[6] the treatment in the chronic type seems to be fairly well standardized, i. e., they should be treated by splenectomy. Leman reported one case which eventually died following eleven transfusions without splenectomy. While transfusions are definitely indicated, they should be given preparatory to splenectomy.

Because of the high mortality[8] there still seems to be some doubt of the advisability of splenectomy in the acute fulminating cases. Pemberton is rather of the opinion that, in view of the very unfavorable prognosis without operation, most of these cases should be prepared by transfusions and a splenectomy attempted. Rankin suggests repeated transfusions and if there is improvement a delay in the splenectomy until the disease assumes a more chronic state, while if there is no appreciable improvement, he thinks a splenectomy should be attempted.

It has been suggested that splenectomy is not essential to the treatment of these cases, that upon the other hand they respond favorably to

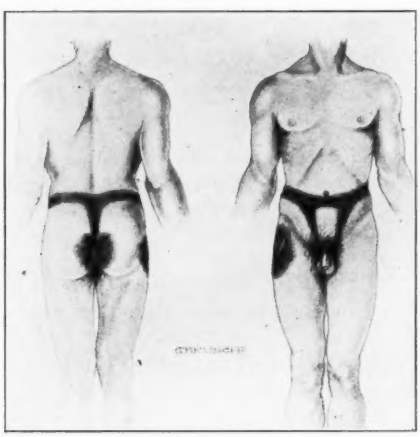

Fig. 1
Showing ecchymotic areas following hemorrhoidectomy and removal of lipoma of right thigh.

any form of trauma. This certainly is not borne out in the author's cases, as the severest symptoms occurred immediately following an operative procedure. As the result of the hemorrhoidectomy and the removal of the lipoma, a condition which had been more or less quiescent was immediately transformed into an acute fulminating condition, which required repeated transfusions to control it.

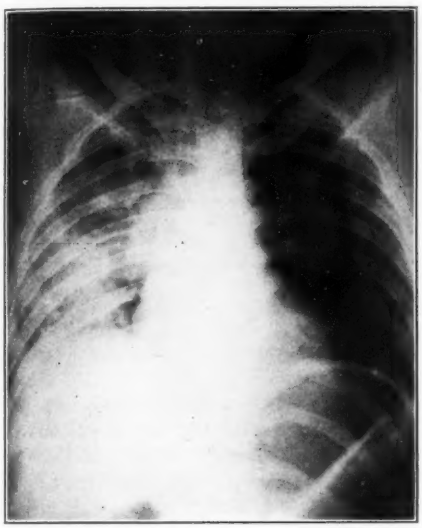

Fig. 2
Condition of right chest twenty-four hours after hemorrhoidectomy.

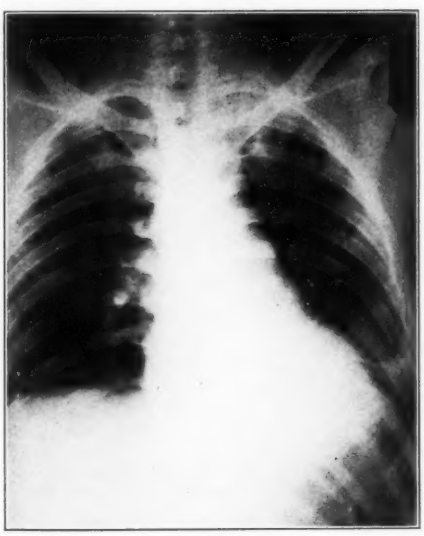

Fig. 3
Condition of left chest twenty-four hours after splenectomy.

The operative mortality in the chronic cases is certainly on a par with many other serious abdominal conditions. Pemberton has recently reported a series of 41 cases with 2 deaths, a mortality of approximately 5 per cent. While it is high in the fulminating cases, it should be remembered that it occurs in a desperate condition which results in approximately 100 per cent mortality without operation.

CASE REPORT

W. J. K., age 24, married, male, was admitted to Wesley Memorial Hospital, February 9, 1931.

Family History.—Negative.

Past History.—Since childhood he had had frequent nose bleeds, petechiae and ecchymotic spots after bruises, and occasionally bleeding from the bowel. He was dismissed from the Army because of easy fatigue and frequent nose bleeds. In December, 1929, he was in Wesley Hospital with subacute ethmoiditis for nine days with improvement, and in January, 1930; and he was readmitted for a submucous resection which was without unusual bleeding.

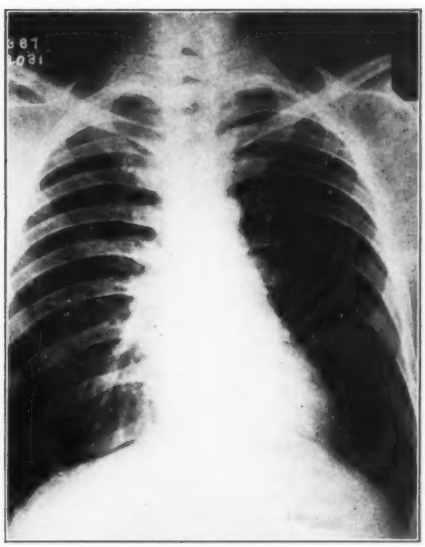

Fig. 4
Lung fields clear two months after splenectomy.

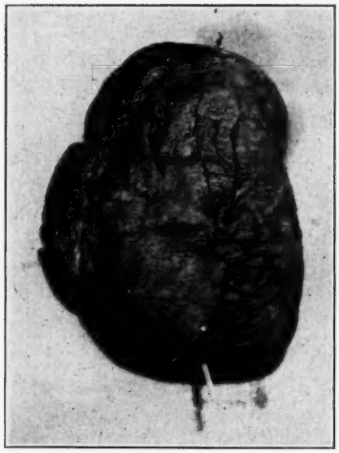

Fig. 5
Spleen twenty-four hours after removal.

Present Illness.—Patient was again admitted May 16, 1930, complaining of protruding hemorrhoids and lipoma of the right thigh. He was rather well developed and nourished but pale.

Operation.—On May 17, 1930, under gas-ether anesthesia, a hemorrhoidectomy was performed (clamp and suture method), followed by removal of the lipoma.

Postoperative Course.—On the day following operation, there was a dark ecchymotic area, 4-5 cms. in width, about the anus, one encircling the operative region on the right thigh, and also an ecchymotic band around his waist under the abdominal strap of his T-binder. His blood picture showed a coagulation time of 3½ minutes with no contractility of the clot: R. B. C., 3,840,000; hemoglobin, 55 per cent; W. B. C., 27,200, with 80 per cent polys; and blood type II. He was transfused with 260 c. c. of whole blood. That evening his signs suggested a pneumonia and he was given Type I antipneumococci serum after sputum typing. His R. B. C. at this time was 3,400,000 with 46 per cent hemoglobin, with a W. B. C. of 23,250, and with 92 per cent polys. The platelets were 60,000. The following day the R. B. C. was 2,010,000 with 50 per cent hemoglobin. His blood cultures were persistently negative. The next three weeks before discharge on June 18, 1931, showed slow convalescence despite a second transfusion of 250 c. c. of whole blood; and he continued to cough and expectorate large amounts of blood-tinged sputum after discharge.

On January 29, 1931, he was readmitted complaining of petechial spots and bruises about the legs and also of nose bleeds, at which time his R. B. C. was 4,700,000 with 70 per cent hemoglobin. His coagulation time was 2½ minutes; his bleeding time was greatly prolonged, platelets were greatly reduced, and the blood calcium was 2 mg. per 100 c. c. He was given 500 c. c. of blood. He was discharged January 31, 1931.

After little improvement he was readmitted February 9, 1931, appearing pale and exhausted. His spleen could not be felt, but he had occasional petechial spots over his body. His blood pressure was 118/80. He was transfused and the following day a splenectomy was performed.

The pathologic report by Dr. E. L. Bishop showed the spleen to weigh 139 gm., being 11½ x 7 cm. The splenic capsule was considerably thickened with the trabeculate quite bulky. He concluded that "there was nothing typical in the specimen of any specific type."

The following day, as after hemorrhoidectomy, the patient again developed pneumonia, this time in the left lower lobe. On February 1, 1931, thirty-six hours after operation, the platelets were 100,000 per cu. mm., and on the following day 250,000. On March 5, three and one-half weeks after splenectomy, the platelets were 300,000 cu. mm., R. B. C. and hemoglobin were normal, as were the bleeding time, coagulation and clot-contractility time. He was discharged on March 6, 1931, greatly improved and has had no return of any of his symptoms.

Comment.—It is interesting that there was no unusual bleeding following the submucous resection; and it was largely because of this and a misleading history that a correct diagnosis was not made before the first operation. The chest complications are also interesting in that the x-ray findings were suggestive of massive collapse, while the sputum showed Type I pneumococcus, and he responded well to pneumococcic serum. Also it was noteworthy that following the first attack he continued to expectorate large amounts of blood-streaked sputum, which persisted until after splenectomy. It appears that the purpura had some direct bearing upon his chest complications.

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URINARY LITHIASIS: ITS CAUSE AND PREVENTION*

AN EVALUATION OF CONTRIBUTIONS TO OUR KNOWLEDGE DURING THE PAST DECADE

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In 1921, under the direction of Dr. W. F. Braasch, of the Mayo Clinic, I undertook a comprehensive review of the literature dealing with the etiology of urinary lithiasis. The details of this study have been published elsewhere and need not be reviewed. Suffice it to say that despite the many theories advocated, none was found acceptable or established on the basis of proper clinicopathological correlation. Ten years have passed and numerous workers have entered the field. I have felt that it would not be amiss again to review the literature and to make a survey of such contributions as have seemed to throw new light upon the process of calculus formation. Undoubtedly, much that follows will ultimately be shown to be only a part of the truth, but with this reservation in mind, let us consider what of practical value has been learned and, if possible, what we may clinically apply.

EVIDENCES OF A DIETARY FACTOR IN STONE FORMATION

Osborne, Mendel and Ferry, in 1921, noted that rats fed on a diet deficient in vitamin A after a period of weeks frequently developed phosphatic calculi in the urinary bladder. Fujimaki, in Japan, in 1926, followed up these observations *in extenso*, using white rats, mice, and dogs. He found that when both vitamins A and B were eliminated from the diet, calculosis was not produced. When vitamin A alone was excluded, 13 per cent of the rats died in a period ranging from 30 to 50 days; 23 per cent of these had phosphatic stones in the bladder. Of those living from 50 to 80 days, 83 per cent were affected with concrements. Rats living as long as 140 days on the deficient ration were uniformly affected with bladder calculosis, and 60 per cent showed calculi in the kidneys. Forty per cent of these were found to have cholesterin stones in the gall-bladder as well. Rats fed on the vitamin A deficient diet and found by x-ray to show shadows of calculi in the bladder were in certain instances placed on a balanced diet. With the ensuing weeks, disappearance of these bladder stones was noted.

McCarrison, in South India, in 1927 confirmed the work of Fujimaki and further noted the significant fact that adding earthy phosphates to the vitamin A deficient diet increased the rate and degree of calculus formation. Likewise, McCarrison found that removing vitamin C along with vitamin A exercised a further influence markedly favorable to stone formation.

Van Leersum, of Amsterdam, in 1928, noted almost parallel findings. Of 645 rats fed on vitamin A deficient diet, 197 developed calculosis. The stones were again found to be composed of calcium phosphate and at times of a smaller amount of calcium oxalate. Calcium deposits in the renal tubules were consistently noted even when frank calculi were not found.

Upon such an experimental basis rests the dietary deficiency theory of lithiasis. The mechanism of stone formation under such conditions has not been determined, but the process appears experimentally at least to be unassociated with demonstrable infection. Along with the changes in the eye, the intestinal and respiratory tracts, a definite tendency to keratinization of the mucous membrane epithelial cells of the urinary tract takes place. It has been suggested that the deposition of calcium phosphate upon effete cells of the tubular epithelium as a nucleus is responsible. However, it is known that in the absence of infection incrustation salts are not deposited upon foreign bodies in the urinary tract. This I demonstrated some years ago experimentally and the observation has been uniformly confirmed by others. An exception in the case of the artificial oxamide lithiasis, presently to be described, may be noted.

Jolly feels that calculosis from vitamin deficiency must be explained as resulting from some action upon the urinary colloids which reduces their power of holding stone-forming salts in solution. Others hold that vitamin deficiency lowers resistance to infection and that the latter will ultimately prove to be the factor in this type of experimental lithiasis.

RELATION OF DIETARY DEFICIENCY TO GEOGRAPHIC INCIDENCE OF STONE

The effort has been made to extend the vitamin deficiency theory of stone to explain geographic variations in incidence. For instance, Ratschitch feels that this is the factor which accounts for the high incidence of stone in the bladder in Dalmatia. Belacesco finds vesical

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*Read in Section on Urology, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

*EDITOR'S NOTE.—Figures 1, 3, 6, 7 and 8 are reproduced from a paper entitled "The Mechanism of the Formation of Urinary Calculi," by Linwood D. Keyser, Rochester, Minnesota; from the Division of Experimental Surgery and Pathology and the Section on Urology, the Mayo Clinic; and published in *Annals of Surgery*, Philadelphia, Pennsylvania, February, 1923. ¶Figures 2, 4, 5, 9 and 10 are reproduced from the abridgment of a thesis entitled "The Etiology of Urinary Lithiasis: An Experimental Study," by Linwood D. Keyser, Rochester, Minnesota; from the Section on Experimental Surgery, the Mayo Foundation, and the Section on Urology, the Mayo Clinic; and published in *Archives of Surgery*, Chicago, Illinois, March, 1923, volume 6, pp. 525-553. ¶Original photographs not being available for making cuts, the cuts in this paper were made from printed reproductions, and therefore are not so clear and sharp as if made from photographs.

calculus frequent in the poorly nourished in Roumania. The high incidence of stone in the Indian Punjab and in the Canton district in China may possibly be explained upon such a basis. Tropical countries are peculiarly liable to stone and here we find the fat-soluble vitamins and proteins lacking in the dietary. Holmes and Coplan, in an excellent survey, found the incidence of calculus high in Florida and California and felt that its occurrence in the population was somewhat parallel with the ingestion of food high in alkaline ash, but low in proteins and vitamin A (acid ash foods).

Jolly has been able to trace a dietary vitamin deficiency in the stone-forming districts of China, India and England. He feels that the diminished incidence of calculus in children of highly civilized races during the past fifty years has accompanied a better hygiene and balancing of the diet, with especial appreciation of the value of fresh greens, milk and cod liver oil. The relative but by no means absolute exemption of the negro from calculous disease is attributed to the fact that his dietary is rich in meat.

THE CHEMICAL MECHANISM OF STONE FORMATION

Rainey, in 1856, and later Ord and Shattock determined the physical principle that colloidal matter *in vitro* would modify crystalline morphology. Especially it was noted that crystals of calcium oxalate would be precipitated from aqueous solution and from solutions containing gelatin, mucin, albumin and other colloids in widely different forms. Ord traced a number of morphologically related crystalline forms which varied with the amount of colloid and salt present. Furthermore, he found that certain of these crystals tended to remain isolated, while others, especially the spherical types, tended to fuse. *Fig. 1* shows these coalescent and non-coalescent varieties of calcium oxalate in a schematic manner. From a microscopic study of oxalatic and uratic calculi, Ord concluded that they were structurally made up for the most part of the coalescent variety of crystal. Now it is well known that the power of the urine to hold the water-insoluble salts of calculi in solution is due to the presence therein of protective colloids. Lichtwitz and Schade especially have confirmed the role of the protective colloids as factors in urinary solubility. These observations marked the beginning of a newer concept of the mechanism of stone formation from the standpoint of physical chemistry.

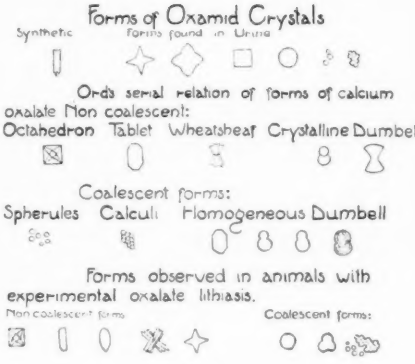

Fig. 1

A diagrammatic sketch of the serial relationship of non-coalescent and coalescent forms of oxamide and of calcium oxalate crystals. W. M. Ord in 1871 recognized the power of colloids *in vitro* to modify the morphology of crystalline matter and traced the relationship of non-coalescent and coalescent varieties of calcium oxalate as shown above. Later he showed with Shattock that the coalescent forms constituted the structural units of calculi as seen microscopically.

In 1921 I studied the experimental production of calculi in animals (rabbits and dogs) by feeding diamidooxalic acid (oxamide). Ebstein and Nicolaier first demonstrated this form of experimental calculosis in 1891. I found that oxamide fed to rabbits produced calculus in high incidence after a period of several weeks (*Fig. 2*). The process was aseptic and the oxamide stones on chemical analysis were found to be composed of the unaltered chemical plus urinary pigment. Synthetic oxamide fed by mouth was deposited in the urine in the form of an isolated unfused cross and also as a coalescent fusing spheroidal form (*Fig. 3*). The calculi were made up of the fusing type of crystal. They became laminated (*Fig. 4*) as they grew and presented the physical features of calculi seen clinically. It was further found that synthetic oxamide dissolved in boiling urine. However, it being reprecipitated on cooling

Fig. 2

Bilateral lithiasis in a rabbit fed oxamide daily for seventeen days; larger masses lie behind the free margin where the calices are attached to the renal parenchyma.

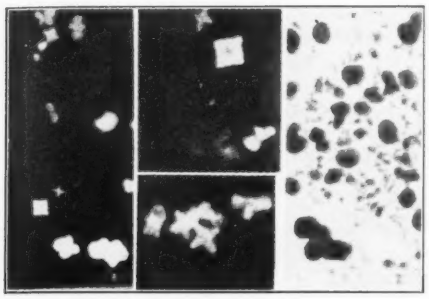

Fig. 3

Oxamide crystals as observed in urine under the influence of the urinary colloids. These crystals have assumed a morphology altogether different from the synthetic form. We can trace the evolution of crystals through non-coalescent crosses, crosses with interbrachial spaces partly filled out, squared forms and coalescent spheroids.

Fig. 4

Fragment of an oxamide stone showing radial markings and the deposition in concentric layers; X200.

took up urinary pigment and changed to the form of crystal seen in the urine of animals with experimental lithiasis (*Fig. 5*). Small doses of oxamide fed to rabbits caused a deposition of the isolated cross type of crystal, while larger doses produced an abundance of fusing spherules and concrement formation.

Next, I attempted to concentrate calcium oxalate in rabbit's urine. N-butyl oxalate and calcium chloride in chemically proper amounts were injected subcutaneously. A profuse oxaluria resulted. In 10 instances of 50 attempts experimental calcium oxalate concretions were found (*Fig. 6*). The morphology of the crystals was carefully studied and it was found that the stones were composed of the coalescent spherular variety of crystal which Ord had produced *in vitro*. As long as the animals showed only the isolated octahedral or envelope form of oxalate crystal in the urine (*Fig. 7*), no calculus occurred. When oxaluria was produced to the degree that the spherular forms predominated, then concrement formation was noted (*Fig. 8*).

I can only touch the high points of this study which has been published in detail and which has been frequently quoted. I feel that this ex-

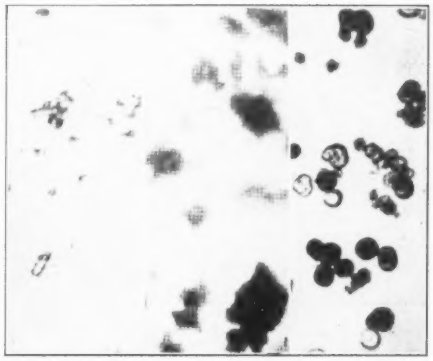

Fig. 5-a (left)—Crystals of pure oxamide synthetically prepared; X300.

Fig. 5-b (center)—Deposit obtained when synthetic oxamide is dissolved in boiling urine and allowed to precipitate on cooling. The crystals are the developing-cross type; they are pigmented and show marked tendency to fuse into small agglomerations. This sediment is indistinguishable from that in the urine of rabbits fed on oxamide; X300.

Fig. 5-c (right)—Oxamide crystals deposited *in vitro* from urine in which the synthetic chemical was dissolved by boiling, showing the perfect smooth sphere and no tendency to fusion; X200.

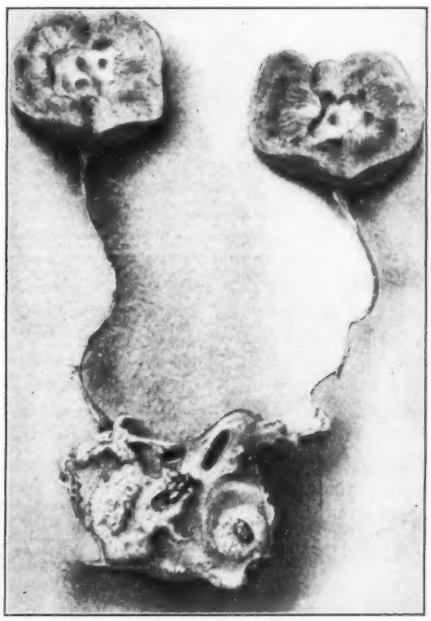

Fig. 6

Calcium oxalate stones in bladder. Result of intense oxaluria produced by injection of normal butyl oxalate and calcium chloride.

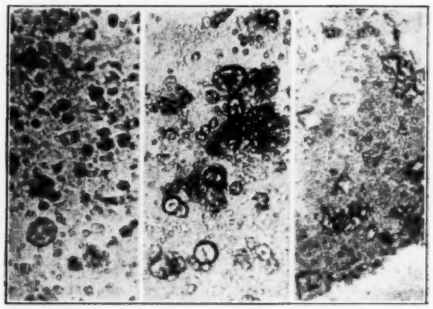

Fig. 7

Small calcium oxalate calculi experimentally produced as in text, crushed on slides to show crystalline elements in structures. Note that the small fusing spheroids constitute the structural units.

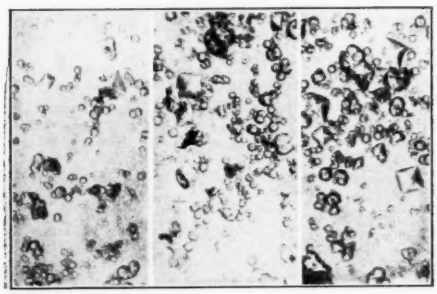

Fig. 8

Sediment from freshly voided urine of patient A334473. This patient has been passing calcium oxalate calculi frequently for years. Note similarity of the oxaluria to that experimentally produced. The predominance of coalescent forms is a remarkable feature.

perimental chemical calculosis can be explained only by the fact that such an intense oxaluria or oxamiduria was produced that the protective colloids could no longer handle the solution of the crystals. Instead of carrying the material through in solution or of depositing it as isolated crystalline matter, a coalescent or fusing form of crystal was deposited with consequent concrement building.

Rost has similarly reported the formation of oxalate calculi in experimental animals from a diet of tomatoes and also from the administration of sour beer. He feels that vitamin deficiency alone does not account for the process.

These observations upon the crystalline morphologic features of stone formation seem to show that ultimately the process is one of atypical physicochemical precipitation, the mechanism involving an inadequacy of the solvent action of the urinary protective colloids. In short, if there is excessive quantitative crystalline excretion, or if the ability of the colloidal mechanism to deposit isolated crystals is interfered with by the production of abnormal colloids which may arise either from metabolic sources or from the products of bacterial inflammation, then calculus formation results. This takes place because of the precipitation of a fusing or coalescent variety of crystal.

Clinically, in patients passing showers of calculi, we may have an opportunity to observe such atypical crystalline deposition. *Fig. 8* illustrates the process in a patient observed at the Mayo Clinic. In this case repeated recurrence of oxalate lithiasis was accompanied by an oxaluria of the coalescent crystalline type. We have several other instances of this which are to be detailed in a separate report.

Beer, of New York, notes that uric acid showers with calculosis are accompanied by the excretion of urine which shows an abundance of atypical uric acid crystals on standing in the test tube.

So far as excessive quantitative crystalline excretion is concerned, much has been written, but oxalurias and phosphaturias have not been shown to be associated with excessive quantitative secretion of these chemicals or consistently with lithiasis. Phosphaturia may be of such a degree as to afford the passage of urine milky with sediment, yet there may be no calculus or encrustation associated. Apparently the colloids of the urine are still able in such cases to deposit isolated, non-fusing types of crystals.

THE ROLE OF INFECTION

For years infection has been conceived of as the necessary factor in lithiasis. Albarran divided calculi into primary types, unassociated with infection, and secondary types, associated with urea-splitting organisms.

Rosenow and Meisser in 1922 isolated a green-producing streptococcus from the urine, teeth and tonsils of 9 patients with recurrent urinary calculi. These streptococci were implanted into the devitalized teeth of dogs. Urinary calculi, easily visible at autopsy, developed in 20 of 34 dogs thus treated. Thirty dogs revealed either calculi or localized lesions in the renal medulla or both. It is to be noted that 11 per cent of the animals used in this laboratory at the time showed evidence of minute calculi independently, but none was so large as those found in the experimental animals.

Hager and Magath, in 1925, isolated a gram-negative bacillus of the Salmonella group from the urine of patients suffering with alkaline encrusted cystitis. They found this a urea-splitting organism which produced white colonies on Endo medium; formed a moist, more or less sticky, blueish-gray, glistening colony on agar;

fermented with production of acid and gas, glucose, galactose and xylose; produced acid in glycerin and to some extent in litmus milk. They called this organism *Salmonella ammoniae*. A closely related organism, *B. proteus ammoniae*, was also isolated from the urine of similar patients. The chief characteristic of these organisms is their ability to split urea into ammonia and carbonic acid in a relatively short time.

It was found impossible to implant *Salmonella ammoniae* into the bladder of experimental animals until a chemical cystitis had been produced by the intravesical injection of 0.5 c. c. of 1-1000 salicylic acid in alcoholic solution. After such a chemical ulcerative cystitis was produced, an injection of the bacterial culture was followed by chronic encrusted cystitis with alkaline urine. Twenty-one of 22 guinea pigs and 6 of 10 rabbits thus treated developed the lesion. Phosphatic calculi of re'atively large size were frequently found.

Since this observation was reported numerous authors have isolated *B. proteus ammoniae* from patients with alkaline encrusted cystitis and urinary calculi. It has also been isolated from the stool. Hager and Magath regard the organism as a secondary invader in the bladder and feel that its action in splitting urea with consequent formation of ammonium magnesium phosphate and carbonic encrustations takes place only in the presence of a previous infection which prepares the soil for its implantation.

Rovsing feels that urea-splitting organisms account for 71 per cent of the recurrences of stone. He goes so far as to advocate nephrectomy in renal lithiasis when a urea-splitting organism is found unilaterally. Hellstroem believes that staphylococci and colon bacilli may produce calculus by action upon the urea and notes that aseptic calculi grow slowly while those due to infection progress rapidly in size. Hyman notes a series of bacterial stones in which bacteria form the nucleus. Cifuentes, Legeu and Coidan, Lau and others have given valuable clinical evidence that persistent infection associated with urostasis is the chief factor in the recurrence of stone.

UROSTASIS AS A FACTOR IN LITHIASIS

Clinically, it has been held for years that stone seldom forms in a urinary tract with perfect drainage. Some authors go so far as to say that the process is always associated with urinary stagnation, increased surface duplications, foreign bodies, or injury to the urinary tract. For instance, stone and tuberculosis are associated in 1 per cent of the cases. Carcinoma and calculus are common. In 54 cases of papilloma of the renal pelvis, 10 were found with calculus (Miller and Herbst). Eisendrath in 132 cases of horseshoe kidney found calculi in 51. Braasch and Foulds found recurrence in 24 per cent of cases treated by nephrotomy, but in only 4.1 per cent of cases treated by nephropelviolithotomy. Rovsing, Lau, Hellstroem, Legeu, Spitzer and Hillkowitz and others uniformly emphasize the role of stasis as a factor in maintaining infection and consequent concrement formation. Hunner believes that ureteral calculus arises most frequently at the site of ureteral stricture and advocates vigorous treatment of this stasis-producing factor in the prevention of recurrence. Rathbun is emphatic in his adherence to this view. Stirling, in discussing kidney stones, notes its incidence in 15 per cent of cases of prostatic obstruction. Scheele, in describing spontaneous reduction in the size of kidney calculi in a series of cases after cessation of pregnancy, feels that explanation is found in better drainage, reduction of infection and change from alkaline to acid urine.

While the clinical data emphasizes the association of lithiasis and stasis, we are overwhelmed with an abundance of evidence which refutes the stasis factor as being the primary one. Vesical neck obstructions, vesical diverticula, ureteral strictures, hydronephrosis, bladder ulcerations and urinary tract infection with urostasis, in general, are more often found without concomitant calculus than with it.

Experimentally, the production of urostasis *per se* almost never leads to calculosis. Stasis in itself is not a cause. However, when the stone-forming mechanism is present, when crystals are being so deposited by infection or colloidal disturbance that they tend to fuse, it can be easily understood how stagnation enhances their retention and growth. Let me illustrate with an experiment performed by me in oxamide lithiasis.

A rubber band was placed around one ureter of a rabbit very loosely in such a manner as not to constrict it but to depend upon the irritation of its presence as a foreign body to produce a degree of urostasis insufficient to interfere with renal secretion. The animal was then fed 0.8 gm. oxamide daily. Deposition of oxamide in an amount far in excess on the treated side as compared with that untreated was consistently noted (*Fig. 9*). Again one kidney was surgically exposed and multiple needle punctures made therein. Animals thus treated developed concretions in larger size and greater quantity in the traumatized kidney than in the opposite normal organ.

If oxamide lithiasis represents at least a physical reproduction of calculus formation, these experiments are noteworthy as showing how stasis, surface duplication and inflammatory reaction can work as factors favoring retention of stone-forming material and concrement building.

Fig. 9

Marked deposit of oxamide in left kidney of a rabbit fed oxamide nine days as the result of low-grade stasis caused by rubber band around the left ureter. The untreated right kidney is clear.

A CONSIDERATION OF FOREIGN BODY ENCRUSTATIONS

The evidence we have shows that foreign bodies tend to remain unencrusted until infection occurs. Foreign bodies, bits of stone, muscle tissue and the like, placed in the renal pelvis or bladder remain unencrusted unless some other factor such as infection enters into the picture. I have repeatedly made this observation experimentally. Using the oxamide type of lithiasis again, let us see the effect of a foreign body on the process. A piece of muscle tissue was aseptically placed in the renal pelvis of a rabbit and the animal fed with oxamide. *Fig. 10* shows the large calculus encrusted upon such tissue. The untreated kidney is clear as the amount of oxamide fed was smaller than that usually found necessary for spontaneous stone formation under such conditions. Here we have a striking example of the effect of stasis and surface duplication upon the lithifacient process. I believe we can readily draw a lesson from these experiments. As has been shown by White and others, foreign bodies may remain for years in the urinary tract unencrusted. Phosphatic encrustation associated with infection is the type usually found. As in the case of stasis, we may draw the conclusion that foreign bodies act to start encrustation by provoking inflammatory changes. If such inflammation causes a stone-forming type of crystalline precipitation, encrustation then takes place.

THE REACTION OF THE URINE AND ITS CONCENTRATION AS FACTORS IN LITHIASIS

Much has been written concerning these topics. Experimentally, Hinman and his co-workers felt that oxamide lithiasis in their hands was favored by alkaline urine. My own observations upon this point did not so impress me. It is well known that calcium oxalate, uric acid, ammonium and sodium urate (Albarran's primary calculi) are usually deposited in urines of a variable range of acidity. Crystalline calcium carbonate and calcium phosphate are said to be formed in urines, alkaline, faintly acid, or neutral. Ammonium magnesium phosphate and the amorphous types of calcium carbonate and phosphate (Albarran's secondary calculi) are found in alkaline urine, this alkalinity being produced probably uniformly by urea-splitting organisms. Various mixtures of salts laminated upon one another are thought to be present in stone as the result of a changing reaction in the urine from time to time. Holmes and Coplan, McCarrison and others feel that an intense urinary alkalinity predisposes to stone. This evidence is from clinical sources and is for the most part speculative. Changing the reaction of the urine by

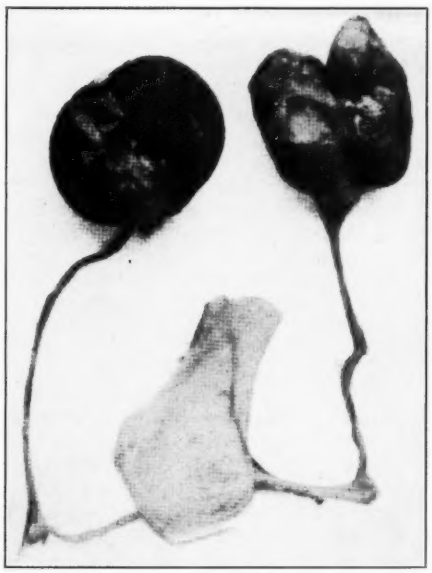

Fig. 10

Kidneys of a rabbit fed oxamide, showing the formation of an oxamide calculus around an organic nucleus or foreign body (muscle tissue), previously placed in the left renal pelvis. A striking example of the role played by stasis, duplication of surfaces, and minute diverticula. The right untreated kidney is clear.

diet and drugs, while clinically advocated, has by itself brought no consistent results in either solution or reduction in the size of stone.

Likewise, concentration of the urine is a moot point in etiologic consideration. Begg, Roberts and others feel that it is a factor in stone formation among tropical natives who micturate at times only once in several days.

We may presume that the urinary reaction in itself has no part in starting stone formation. If this process is present it determines the type of crystalloid deposited. Also, if the calculus-producing mechanism is active, one can see how concentration of the urine would favor the process.

RARE TYPES OF CALCULI

Ibrahim and others have noted the high incidence of calculus in urinary bilharzia infection. Whether such stones are encrustations upon the eggs of these parasites or due to colloidal interference by inflammatory exudates produced by them is speculative. Probably this type of lithiasis has no direct bearing on the problem of stone formation in general.

Cystin calculi are associated with an inborn error of metabolism in which cystin, the sulphur-containing amino acid, instead of being converted to taurin or sulphates as normally happens, is excreted as such in the urine. Alkaline urine carries the cystin through in solution, but in acid urine it is deposited as crystalline material which frequently forms stones. Crowell has reported solution of cystin stone by administration of alkalies and renal lavage. The conditions under which formation of cystin calculi may occur suggest that the mechanism of the process may be similar to that found in experimentally produced oxamide and oxalate stones.

Xanthin calculi are rarely found. Ordinarily xanthin is soluble in urine, but xanthin crystals appear at times for reasons unknown. Possibly there is supersaturation or the protective colloid mechanism is deficient. Seven cases of xanthin stone have been reported by Rosenbloom.

Two cases of indigo calculi, a number of fatty type (urostealiths), and a few of cholesterol are recorded. The conditions necessary for their formation are not known.

Soft stones of fibrin or albumin are occasionally observed. These consist of fibrin and calcium phosphate in alternating layers. They are often associated with hematuria. Pedrose finds these and bacterial stones in tuberculous kidneys at times. Hyman collected 22 instances of such concretions in the literature. It will be remembered that Schade produced laminated stones *in vitro* by precipitating fibrin and calcium phosphate, oxalate, and so forth, from the same medium. This was one of the earlier bits of experimental evidence for the colloidal precipitation mechanism of stone formation and probably explains at least the occasional formation of fibrin calculus in cases of hematuria.

The clinical association of spinal injuries with calculus formation has been called to our attention by Mueller, Seefisch, Simon and others, while Thorn reports a case of recurrent calculus in a paraplegic. Whether there is a neurotrophic disturbance here or whether stasis and infection of stone-forming type are present is impossible to say.

A TENTATIVE CONCEPTION OF STONE FORMATION

From a review of the evidence, with the certainty of having to modify our opinions in the light of further research, it may not be presumptuous to say that stone formation in the uratic, oxalatic, cystin and crystalline carbonate and phosphate types may be an aseptic process in which some error of metabolism brings about imbalance in the solvent capacity of the protective colloids of the urine. So far as we know, increased quantitative elimination of these salts is not necessary for the process. Some local mechanism is present in the kidney which precipitates them as fusing crystalline material.

We may venture the hypothesis that calculus may start at times as an aseptic process and that secondary infection may cause secondary deposition of phosphates upon a primary stone as a nucleus. This, together with a shift in the reaction of the urine, may explain the lamination of phosphate and carbonate upon a central core of urate or oxalate.

Vitamin A deficiency is experimentally associated with calculus formation in several species. Here vesical stone of phosphatic type is the rule. Clinical evidence supports the view that human beings on deficient diet are also more or less subject to bladder stone. With this concept we come to a better understanding of variations in the geographic incidence of calculous disease and its occurrence in endemic centers.

Infection with streptococci and with *Salmonella* or *B. proteus ammoniae* have been experimentally and clinically found associated with urinary calculi and with alkaline encrusted cystitis. The close relation of stones of amorphous

phosphate and carbonate of lime and of those composed of ammonium-magnesium phosphate to an infectious process seems fairly well established.

Urostasis in the light of present knowledge is not a cause of stone. Experimentally and clinically, it favors infection and when stone-forming urine becomes stagnant a more rapid growth of calculus ensues.

HOW FAR ARE WE JUSTIFIED IN APPLYING OUR PRESENT KNOWLEDGE CLINICALLY?

Redewill and Kearns and Turkeltaub have treated alkaline phosphatic cystitis purposively with high vitamin A diet. I feel that in treatment against recurrence there is far more justification for a balanced diet high in vitamin A than for the frequently advocated restriction of lime salts and the use of distilled water, procedures probably without merit.

The stone removed should be analyzed carefully and its constituents noted. In the case of uric acid and oxalate calculi, a diet low in these ingredients may be indicated, but there is really little evidence to place such a diet on a rational basis. Such stones along with cystin calculi should be treated prophylactically by alkalinization of the urine.

In the light of our present knowledge, forced elimination, good general hygiene and the elimination of foci of infection constitute our chief prophylactic procedure against stone formation at the outset.

At operation, care to secure all fragments and to avoid exposure of suture material to the urinary stream, the avoidance of undue trauma and the maintenance of adequate urinary drainage are important factors in preventing recurrence.

Postoperative x-ray, immediately, at 6 months and one year after operation should be practised routinely. Every patient with calculous disease has a 4 to 20 per cent chance for recurrence. Recognition of this fact should be more emphatically emphasized.

The removal of stasis points in the urinary tract by cystoscopy or by surgery should be attempted. Repeated renal lavage at stated intervals with the purpose of maintaining good drainage and of clearing up residual infection are rational procedures and should be practised more frequently. Whether to periodic renal lavage should be added ureteral dilatation will depend upon one's ideas of ureteral stasis as a factor in urinary tract infection. Personally, I practise dilatation, but this opens up a much disputed subject which I do not wish to consider now. At least periodic lavage at intervals of two to three months during the first year after removal of stone from the urinary tract is not asking too much of the patient. If he is reasonably tolerant to cystoscopy, it may be done as an office procedure.

Several cases suffering repeated recurrence of calculus in my personal experience have been striking in the response made when good drainage and subsidence of infection were established by vigorous treatment along the above lines. While they are to be made the subject of another paper, 2 patients may be briefly mentioned as illustrative.

A young man of thirty-five had been passing showers of small phospatic stones from each kidney at intervals for seven years. Removal of tonsils, of infected teeth and massage of an infected prostate failed to prevent the process. Persistent infection and frequent passage of small ureteral calculi became so intolerable that periodic lavage of the kidneys with bilateral ureteral dilatation was decided upon. This was carried out at intervals of six weeks to three months over a period of one and one-half years. After an initial exacerbation of the colon bacillus infection, the patient steadily improved and no further calculus formation was noted. It is now three and a half years since the last cystoscopy. No stones have been passed since such prophylactic treatment was well established. The urine is almost free from pus and x-rays are negative for calculus.

Five years ago I began the treatment of a young nurse who had had recurrence of stone in her right kidney one year after pelviolithotomy. Finally a right nephrectomy had been done for calculous pyonephrosis. She was seen by me a year later with a small calculus in the upper calyx of her left kidney. Cauterization of an infected cervix was done and several dead teeth were removed. Then repeated dilatation of the ureter and lavage of the remaining kidney was begun. This has been employed at intervals over a period of four years. At times she has slight attacks of pyuria and left lumbar backache, but these are transient. The stone shadow has increased slightly in size and density over five years. Whether this calical stone would have repeated the history of the calculous process on the right side is problematic, but I feel that the clinical course of the case has justified the treatment.

CONCLUSION

In conclusion, we may say that our conception of stone formation has been made somewhat clearer as the result of contributions made during the past ten years. We have several new working hypotheses. Much checking up remains to be done clinically and experimentally to see whether the observations reported will stand the test of time.

In the line of further research, a study of the crystalline morphology of urinary sediments in vitamin deficiency and in experimental infec-

tious types of lithiasis seems immediately indicated. Likewise, consistent observations of urinary sediments of patients with calculous disease will do much to evaluate the colloidal precipitation factor in the etiology of stone.

As the matter now stands, vitamin deficiency, poor hygiene, an indeterminate colloidal imbalance in the urine, and infection seem to be the causal factor in calculus. Urostasis, while not a cause in itself, certainly favors the process and by keeping up infection is one of the greatest factors in recurrence.

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Discussion follows paper of Drs. Bromberg and Riven, page 1044.

SILENT RENAL CALCULI*

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Silent or symptomless calculi of the kidney and kidney pelvis are not so rare in the experience of most urologists as the relatively infrequent reports in the literature would indicate. They furnish an explanation for a limited number of instances of persistent albuminuria and microscopic bleeding without apparent cause. It is common knowledge that massive bilateral calculi may be discovered accidentally by the roentgenologist or internist when examining the patient for some other complaint. Macintyre,[1] in 1896, first demonstrated stones in the kidney by roentgen ray examination. Young[2] described stones accidentally found at autopsy. Localization particularly in the kidney pelvis was noted by Cabot,[3] who described stones of considerable size which gave no symptoms and called attention to the fact that the larger the stones the fewer the symptoms. Further instances of silent stone have been reported by Chute,[4] Phelps[5] and others. In all cases the diagnosis was made by the roentgenogram or necropsy.

The etiology of renal calculi has been in dispute for a long time. The most recent theory is that of Willard Gibbs,[6] who states that in the daily elimination of water as urine there can be carried off twenty to thirty times more solid matter than could be dissolved in a similar amount of plain water without colloids. Crystalloids or ultramicroscopic crystals arrange themselves at the surface of the colloid, reducing the surface tension between the urinary colloids and the water of the urine and are therefore largely adsorbed by urinary colloids. The effect of such adsorption is to cause a great increase in the solubility of the more insoluble salts; it has little or no action on those freely soluble. It has been stated that the solubility of sparingly soluble salts is a thousand fold greater in starch solution than in water. It must be remembered that the individual molecule adherent to the surface of the colloid may return into the solution and its place may be taken by another and so on. In this way one may explain the formation of crystals. It is also well known that one may pass urine loaded with crystals of uric acid or calcium oxalate for years without developing stone. There are two theories as to how this is accomplished. Lichwitz[7] assumes that these crystals may adhere to the epithelial lining of the urinary tract, if there is a difference in surface tension between the urine and the epithelium, and that such difference may be produced either by change in the epithelium or in the urine. Jolly[8] thinks that retention of urinary crystals can be explained on anatomical grounds alone, without change in the urine, or the epithelium. He states that crystals are heavier and tend to fall into the lower calyx, which explains the greater frequency of stones in this location. Primary calculi may then be said to be a mass of small crystals cemented together by a colloid. In this way a definite crystalline nucleus is formed and its further growth is largely automatic. At first its growth is slow, though it is always surrounded by a zone of urine, fully saturated with the salts in question, but as it increases in size its rate of growth is proportionately accelerated, and it becomes laminated as it grows by rhythmical precipitation of colloid and crystalloid. The primary stone is rough and acts as an irritant to the epithelium, which in turn soon coats it with a smooth surface of colloid. Then crystals are again deposited upon this smooth colloidal surface and it becomes rough again and so on, which explains the laminated structure of the stone. In this connection it is also well to remember that the various crystalline laminae may differ in their constitution, the nucleus may be uric acid, the next layer colloid, the next phosphatic, and so on, depending upon the nature of the urine zone surrounding and feeding the stone. When infection takes place phosphates are deposited and, once infection occurs, it persists until the stone is removed.

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The problem of the recognition of silent renal calculi is not purely academic. It is highly important from the prognostic and therapeutic standpoint. Size is not a factor, for we are not concerned with those that pass silently from the urinary channels. Only the retained stone, irrespective of the size, will sooner or later result in marked renal change. Furthermore, the pathological lesion in the kidney will not always correspond to the urinary findings. It is, therefore, easy to visualize a state where sepsis and even renal insufficiency may be overlooked. In order to determine the frequency with which silent renal stones occur, we have examined 1,500 films of the abdomen from the Roentgen Ray Department of Vanderbilt University Hospital. These films, made over a period of two years, were of the gastrointestinal tract, the gall-bladder and the lumbosacral spine. Five instances of silent renal calculi were found. Of these, three were removed, the indications being renal infection, renal insufficiency, or both. Furthermore, all these cases were of symptomless calculi in which roentgenograms first pointed to a renal cause for the symptoms.

Case 1.—I. H., a 50 year old white woman, was admitted to the medical service complaining of nervousness, epigastric distress and pain in the left side. She dated her illness to September, 1929, following an attack of malaria which confined her to bed for three weeks. Four weeks after this attack had subsided, she gradually developed a dull aching pain in the right upper quadrant of the abdomen. This was intermittent in character, not relieved by food or soda, and not related to meals. There was occasional nausea but no vomiting. Ten days prior to her admission she developed a dull aching pain, localized around the umbilicus, lasting a varied length of time, and not associated with any chills, fever or jaundice. This was more or less continuous, and on the advice of her physician she was sent to the hospital. There was no history of urgency, frequency, hesitancy, polyuria, retention, dribbling, incontinence or smoky urine. The past history was of no significance. Physical examination revealed a moderately obese adult female, in no apparent pain or discomfort. Head, eyes, nose, ears and mouth were negative. Examination of the lungs revealed some dullness at the left lower base, associated with an occasional fine crackle, which cleared up after coughing. The heart was not enlarged, the sounds were regular, and there were no murmurs. The blood pressure was 180/100. Examination of the abdomen revealed a scar, just above the umbilicus and over the lower midline. There were no tender areas or palpable masses. Liver, kidneys, and spleen were not palpable. The neurological examination was negative as were the pelvic and rectal examinations.

The tentative diagnoses of mild cholecystitis, spastic colon, obesity and hypertension were made. The patient had a gastrointestinal x-ray examination on July 15, 1930, and although this was negative for disease of the stomach, duodenum and colon, a shadow was found in the region of the right kidney. This was the first indication of a possible renal calculus in this patient. Inquiry about calculus was made which revealed no history of any symptoms. The patient had a cystoscopic examination which was reported as follows. The cystoscope entered the bladder without difficulty; with the exception of a rather small urethral opening, the bladder appeared normal. A number five catheter passed to the pelves of both kidneys without obstruction. Urine dripped freely from each pelvis. Phenolsulphonephthalein intravenously appeared in full concentration in normal time from both sides. Flat plates were made of the kidneys, after which 10 c. c. of 12 per cent sodium iodide was injected into the pelvis of the right kidney. A pyelogram showed that both kidneys were fairly well visualized and appeared normal in size and shape. An area of increased density was noted over the mid portion of the right kidney. The gall-bladder was faintly seen and distinctly separated from the kidney area. The right ureter was tortuous in the lower portion, and there was moderate clubbing of the calyces, but no dilatation of the pelvis proper. The right ureter was slightly larger than usual, but probably within upper limits of normal in size. In the superior calyx a stone was found to be present.

Fig. 1

I. H. had symptoms referable to the gall-bladder region. A roentgenogram of this area revealed a shadow in the region of the right kidney. The above illustrates the location of this shadow in the right kidney pelvis.

Urinalysis done on repeated occasions showed no albumin but many pus cells and leucocytes. *Fig. 1* illustrates the stone in the right kidney pelvis. The patient refused operative interference, and as far as we know still has this renal calculus, which apparently is not giving her any symptoms.

Case 2.—H. S. S., a white man, aged 34, was sent by his physician to us because of pyuria. At the age of 14, the patient had some urinary symptoms, namely: slight interruption in urination, dysuria, and urgency. These symptoms were not very severe, and did not require any medical attention until the age of 21, when an examination by his physician revealed a stone in the bladder. This was removed by the suprapubic route. No examination was made of the upper urinary tract.

Fig. 2

H. S. S. had a stone removed from the bladder with no investigation made of the upper urinary channels. During an attack of pneumonia 13 years later a pyuria was found which persisted after convalescence. Investigation of the cause of the pyuria revealed the above staghorn type of stone in the pelves of both kidneys.

Following the operation he was perfectly well, until two months preceding his visit to us, when he developed pneumonia. This was uneventful except that his physician found pus in his urine. The pus persisted after recovery and he was sent to us for consultation to determine the origin of the pyuria. There was no history of renal colic, painful urination or frequency.

A cystoscopic examination was made, the cystoscope entering the bladder without difficulty. The bladder was normal except for a moderate trigonitis. Catheters passed to both kidneys without obstruction, and urine dripped freely from both sides. Specimens were obtained for culture and examination. The urine from the left kidney showed two-plus albumin, many red blood cells and some pus. Phenolsulphonephthalein injected intravenously appeared in full concentration in five minutes from both sides. A plain roentgenogram was made which showed an enormous stone of the staghorn type completely filling the left kidney pelvis, branching out and extending into the major and some of the minor calyces.

On the right side were several calculi as large as small marbles. The diagnosis of bilateral renal calculi plus infection was made. A large stone in the right side was removed through a posterior pyelotomy incision, and at a later date a nephrectomy was done on the left side. *Fig. 2* shows the huge stone which was present in the patient's kidney, without causing symptoms.

Case 3.—E. C., a white woman, aged 51, came to the hospital because of pain in the epigastrium and the left flank. She dated her illness back two years, following a hysterectomy after which she noticed some pain in the left flank. She described her symptoms as a sensation of tightness around the waist. This was associated with swelling of the abdomen, gaseous eructations, and occasional vomiting. Associated with this there was a gnawing pain localized in the epigastrium, coming on from one to two hours after meals, and relieved by food. She gave no history of passing kidney stones, and had no urinary disturbances of any kind. For the interval of one month preceding admission there was a gradual loss of weight of about six pounds. The past history was negative except for a history of menorrhagia caused by a fibroid which was later removed. Examination revealed a thin, middle aged woman, very nervous but not acutely ill. Head, eyes, throat, and nose were negative. The heart and lungs were normal. The blood pressure was 120/80. Examination of the abdomen showed a mid-rectus scar from the umbilicus to the symphysis pubis. There was a definite diastasis of the recti, but no spasm was made out. A point of localized tenderness was found in the epigastrium. The right kidney could be easily felt; the left was not palpable. There was no tenderness in either flank. The liver and spleen were not felt. The neurological examination was negative. The urine on the first examination showed a trace of albumin, a few red blood cells, and many leucocytes. Subsequent urinalysis revealed no albumin, but many white blood cells, and clumps of pus cells. A tentative diagnosis of peptic ulcer was made. A roentgen ray examination of the gastrointestinal tract revealed no evidence of peptic ulcer, but a shadow in the region of the left kidney.

From June, 1929, until June 1930, the patient was treated conservatively for the gastrointestinal symptoms. On June 20, 1930, she was admitted to the urological service with the same symptoms as before. A cystoscopic examination was made. The cystoscope passed easily into the bladder, and nothing abnormal was found there. A number 6 catheter passed about two-thirds of the usual distance on each side; the right catheter did not drain. Urine was obtained from the left kidney pelvis, which on subsequent examination showed many red blood cells and some leucocytes.

Fig. 3

E. C. had gastrointestinal symptoms for two years. Roentgenogram made in search of peptic ulcer failed to reveal any gastrointestinal lesion, but showed the above shadow in the region of the left kidney.

Pyelograms were made which showed a shadow, interpreted as stone in the left kidney pelvis. A pyelotomy was done on the left kidney and the calculus removed; the patient made an uneventful recovery.

COMMENT

This case is included in the series because of the outstanding gastrointestinal symptoms, with nothing referable to the kidney other than some tenderness in the left flank. In addition, there were no urinary symptoms or findings at the initial examination, but during the course of the year we find the gastrointestinal symptoms persisting and the urine findings changing as shown by the red blood cells, the white blood cells and the albuminuria. *Fig. 3* shows the shadow in the region of the left kidney.

Case 4.—F. G., a white man, aged 26, was admitted to the medical service March 22, 1929, complaining of pain in the abdomen in the region of the umbilicus. The patient stated that as long as he could remember he had intermittent attacks of a sharp knife-like nonradiating pain in that region. The pain had no relation to the taking of food. He was nauseated at times when this was very severe and vomited occasionally. He had never vomited any blood or food eaten the day before. There was a tendency toward constipation, but no diarrhea. This pain had never radiated around the right costal margin, or to his shoulder, and he had never been jaundiced. For the past five or six months the symptoms had appeared in the morning at about five or six. At times these symptoms were relieved by urination. There was no dysuria, hesitancy, frequency, urgency, polyuria, retention, dribbling, incontinence or smoky urine. About two years preceding his admission he passed in his urine mucoid material streaked with bright red blood. He had had gonorrhea in 1926 (three years preceding his admission), for which he treated himself. In December, 1917, he was operated upon for appendicitis, for the relief of the above pain. The pain returned about a week or two after his operation. On physical examination the patient was a well-developed, heavy set white man of about twenty-seven years of age. The head, eyes, and throat were negative. The heart and lungs were normal. Examination of the abdomen revealed a scar about two and one half inches long over the right iliac fossa. There were no tender areas or masses. The kidneys, liver, and spleen were not palpable. Fluoroscopic and roentgen ray examination made of the gastrointestinal tract revealed no gastrointestinal lesion, but suggested a stone in the pelvis of the right kidney (*Fig. 4*). This was the first clue to the presence of a calculus.

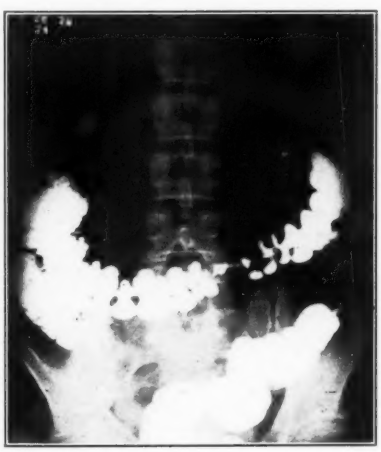

Fig. 4

F. G. had an appendectomy for the relief of abdominal pain, but the symptoms persisted. Later gastrointestinal roentgenograms revealed the above shadow in the region of the right kidney.

Urinalysis showed a cloudy urine with red blood cells, leucocytes, and occasional clumps of bacilli. Because of this finding the patient was transferred to the urological service, where a cystoscopic examination and pyelograms were made. On April 4, a cystoscopy was performed. A 26 F. instrument passed easily; the capacity of the bladder was fair, the posterior urethra and trigone were markedly injected. No stones, new growths nor ulcerations were found. Both ureteral orifices were easily located. The right showed a slight edema. Number six catheters were passed to both sides without obstruction. Urine was collected from both sides. The microscopic examination of the urine showed occasional leucocytes but no bacteria from the right side. The urine from the left side showed many epithelial cells, no red blood cells and no bacteria. The bladder urine was contaminated and showed a few white cells and red blood cells. A pyelogram showed a large shadow in the region of the right pelvis, which suggested stone. It also showed dilatation of the ureter, and blunting of the minor calyces. Pyelotomy was done on the right kidney and the stone was removed. The patient made an uneventful recovery.

Case 5.—H. M., a white man, aged 47, was admitted to the medical service on January 9, 1931, complaining of general weakness. Six years previously the patient thought he had gall-bladder disease because of attacks of pain in the right side below the costal margin. This pain was frequently associated with vomiting and usually came on just after eating. The pain in these attacks was unusually severe. It radiated to the right shoulder but he had never been jaundiced. Since this first began he had gradually become very weak. He had not had an attack since September 30, 1930, five months previously. The patient came to the hospital because of the extreme weakness, and feeling of general illness. He stated that he urinated six to eight times a day, and once or twice nightly. Examination revealed a well-developed, well-nourished adult male in no discomfort. The skin, head, eyes, ears, nose and throat were negative. Heart and lungs were normal. The abdomen appeared somewhat relaxed. There was some tenderness in the right flank and in the upper right quadrant. There was no free fluid, no hernia, nor other abnormalities. Urinalysis showed a two-plus albumin and a sediment which was loaded with many leucocytes. Roentgenograms of the gall-bladder region following oral administration of tetraiodophenolphthalein showed no evidence of filling of the gall-bladder at any time, but showed a completely calcified cast of the right kidney pelvis. Because of the roentgen finding, the albumin and pus cells in the urine, the patient was referred to the urological service where a cystoscopic

Fig. 5

H. M. for six years had pain referable to the gall-bladder region. Roentgenograms made of the gall-bladder after the intravenous injection of tetraiodophenolphthalein showed no visualization of the gall-bladder and the above completely calcified cast of the right kidney pelvis.

examination was made. A 26 French cystoscope passed with slight difficulty into the posterior urethra. The vesicle orifice showed early changes, due to prostatic enlargement. A mild chronic cystitis was present, involving both ureteral orifices. No stones or tumors were seen. A number six catheter passed easily to each kidney. The urine from the right side was pale in color with many leucocytes, occasional red blood cells and a few cocci. Phenosulphonephthalein injected intravenously appeared from the left kidney in two and one-half minutes; the fifteen minute output was 40 per cent. Only a faint trace of the dye returned from the right kidney at the end of fifteen minutes. A pyelogram was made which showed the left kidney at the upper limits of normal in size, and a stone in the right kidney pelvis.

The right ureter was markedly tortuous throughout its course. After filling the right kidney pelvis with opaque solution there was evidence of definite clubbing of the minor calyces with marked narrowing of the middle calyx. There was further evidence of cortical abscess. From these findings a diagnosis of pelvic calculus with hydronephrosis was made. *Fig. 5* demonstrates the size of the stone, and the amount of the kidney destroyed. An operation was advised, but refused.

COMMENT

The summaries outlined above were made from cases selected after a review of 1,500 roentgenograms of the abdomen. Most of these films were of the gastrointestinal tract, gall-bladder and the lumbar spine. It is at least probable that had we studied a larger series a similar proportion would have been discovered. This would suggest that a stone in the kidney is a condition which may be responsible for indefinite abdominal pain especially referable to the gall-bladder and gastrointestinal system. In all such cases careful roentgen ray examination of the kidney is indicated. Furthermore, in all instances in which occult blood, traces of albumin or white blood cells are persistently found in the urine, careful investigation should be made of the upper urinary tract.

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DISCUSSION (*Abstract*)

Papers of Dr. Keyser and Drs. Bromberg and Riven.

Dr. Raymond Thompson, Charlotte, N. C.—I agree with Dr. Keyser that urostasis with infection is a definite cause of stone formation. Stasis and infection are probably the greatest causes.

The incidence of silent renal calculi in 5 out of 1,500 seems a little low, being one-third of one per cent. One would expect silent renal calculi in more cases with symptoms referable to the gastrointestinal tract. Urologists should make a careful examination in all cases where there is albumin, pus, or blood in the urine and where there are any signs or symptoms referable to the gastrointestinal tract.

Dr. Roy J. Holmes, Miami, Fla.—To my mind, confused as it is by the numerous hypothetical ideas on this subject, the theory of the protective action of the colloids furnishes us with the only acceptable explanation for the formation of the majority of calculi. When we consider that the threshold for this protective mechanism may be lowered in some individuals and that it may be affected by either changes in the state of dispersion of the true colloids, changes in their chemical nature, or excessive crystalloid elimination to a point where the protective action of the colloids is insufficient, I believe we can explain at least theoretically why many of these seemingly primary factors are really contributory. Surface evaporation with concentration of the urine, dietary errors, urinary stasis, *Proteus ammoniae* infections, in fact anything which interferes with this delicate protective mechanism, may lead to a condition equivalent to that of crystalloids in water, in which the mechanism of stone formation may readily be observed experimentally.

That the protective mechanism may be overwhelmed is illustrated by Dr. Keyser's experiment in which he

produced calculi by feeding large doses of oxamide. Oxalate stones have also been produced quite recently by feeding animals large quantities of tomato juice.

Southern Florida is one of the largest fruit, vegetable and tomato producing sections in the world. Alkalinuria and calculi are quite common. In our office we saw 63 cases of calculosis out of 211 consecutive urological cases, excluding venereal cases. Being mindful of the facts that the fear of acidosis has been popularized by an immense amount of propaganda from scientific as well as unscientific sources, that vegetables, tomatoes and fruit juices are distinctly alkali producing foods containing practically no fat-soluble vitamin A, we ask that you draw your own conclusions.

The cellular reaction of the secreting tissue, namely, the cells of the convoluted tubules and the loops of Henle, is invariably opposite to that of the urine. Undue demands upon the renal structures, such as excessive administration of alkalis represent, may injure the previously normal kidney cells by increasing renal cellular acidity. According to Stieglitz, an alkalosis, such as may be produced by long continued or excessive administration of alkalis, causes distinct renal irritation and occasionally a true nephrosis.

Dr. Bromberg has called our attention to a urological problem which I am sure we have all encountered in our experiences. Often these experiences are quite embarrassing.

Silent renal calculi are often found in a dilated calyx that has become almost completely shut off from the renal pelvis. The fluid pressure atrophies the renal tissue contained in one of the lobules of the kidney and finally this lobule loses its function. There is no distention of the calyx from this point on and this together with the fact that the renal parenchyma is not supplied with sensory nerves, probably accounts for the absence of pain. On the other hand, stones lodged in the kidney pelvis or in the calices may not give rise to any obstruction in the outflow of urine, the pelvis or calyx will not be dilated, and in the course of time the stone will completely fill the cavity in which it is contained. True parenchymal stones are so rare in the human that some authorities doubt their existence. Renal pain does not occur unless the pelvis or renal capsule is subjected to pressure or distention.

Every urological case which is not frankly venereal must be subjected to a complete examination which includes at least a flat x-ray film of the entire urinary tract.

No matter how obvious the condition may seem, the urologist is expected to find a stone even if it presents no symptoms. This is the exalted opinion of us which is held by our colleagues as well as the laity. We must not allow our well earned reputation for accurate diagnosis to diminish.

Dr. Earl H. Floyd, Atlanta, Ga.—A man who had been in the hospital for thirty or forty days and had passed a number of stones, had been receiving hypodermics because of the pain he had undergone in passing them. On chemical analysis the "stones" were found to be two pieces of cement and not stones at all. I agree with Dr. Keyser that an analysis of stones is sometimes very valuable.

Dr. H. W. E. Walther, New Orleans, La.—In New Orleans, at least 10 per cent of all upper urinary tract abnormalities are due to stone. In some years I have thought that as much as 20 per cent of our cases were stone. That opinion is confirmed by routine x-ray study. Five years ago when the Southern Baptist Hospital was opened I decided that all cases of upper urinary tract disease should be x-rayed.

I must take issue with the statement that the ingestion of fluid in small or large amounts plays no part in stone formation. I have never found stones in water drinkers. The metabolism has a direct bearing upon these cases. Routine basal metabolic tests and routine blood chemical studies in all stone-bearing cases will be of much assistance.

I am glad that other urologists are finding tomato juice cystitis. We have had a good deal of "cystitis" that we have cured by removing tomatoes and tomato juice from the diet.

Dr. W. J. Wallace, Oklahoma City, Okla.—In the etiology of the stone I usually consider about four constituents: first, crystals; second, colloids; third, a nucleus; fourth, some form of an obstruction to normal drainage very often with infection.

In the treatment, particularly the postoperative cases, we must try to remove the obstruction, clear up the infection by alternating antiseptics, intravenous medication and pelvic lavages.

Dr. R. E. Van Duzen, Dallas, Tex.—I have felt for some time that infection and stasis probably play the most important roles in causing urinary lithiasis. Recently Dr. Holmes and others have pointed out the frequency seen in citric fruit eaters. However, we are not always able to remove the contributing factors.

Dr. Keyser (closing).—The stone problem presents so many phases that one is confused in knowing at what point to begin research work.

I was glad to hear Dr. Bromberg speak of the chemical features of crystalline deposition in the urine. The urinary colloids are difficult to approach in a tangible manner from the physico-chemical standpoint. Among those recognized are mucin and the pigments, urochrome and uroerythryrin. By dialysis we can separate the colloids and crystalloids. Under such circumstances the water-insoluble salts fall out of solution.

With regard to the formation of stones in the water drinker, I think Dr. Walther probably misunderstood me. Undoubtedly in excessive drinkers of water we rarely find stone. Likewise the ingestion of large amounts of fluid is one of our most important factors in the prophylaxis against recurrence.

Dr. Floyd's case report suggests the so-called hysterical lithiasis recently described by Braasch. Many cases of ureteral stricture, that condition so much in dispute among present day urological pathologists, are confused with possible silent or non-opaque stones. These patients frequently show renal retention and seek aid for pain in the urinary tract.

It is to be emphasized that stone is frequently present without pyuria. In one large series of cases, about 30 per cent showed no pus or only an occasional leucocyte on the initial examination. I personally have encountered about a dozen such cases where the silent calculus was accompanied by a negative urine at repeated examinations. In one such instance a stone the size of a guinea egg was removed. These patients have non-obstructing stones with urinary drainage sufficient to keep gross infection in abeyance.

In differentiating the causes of abdominal pain, I agree that routine roentgenography of the urinary tract is emphasized in practice.

THE RELATIONSHIP OF CRANIAL SYMPTOMS TO GYNECOLOGICAL DISEASE*

By PERCY H. WOOD, M. D.,
Memphis, Tenn.

The relationship of cranial symptoms to gynecological disease is often overlooked by the practitioner of general and specialized medicine. The autonomic or sympathetic nervous system connects these distantly situated parts. The recurrent headache of the female; the intermittent obstruction of the Eustachian tube, manifested by itching of the ear, deafness, and vertigo; periodic nasal obstruction with sneezing, engorgement of the nasal erectile tissue, coryza and hypertrophies of the turbinates are seldom attributed to pathological conditions of the pelvis, yet in my experience these symptoms cause many of our patients to seek relief. The realization that these complaints may be the result of functional or organic gynecological disorder will aid in their diagnosis.

Schaeffer, Professor of Anatomy at the Jefferson Medical College, in his new treatise on the nose, paranasal sinuses, naso-lacrymal passageways and olfactory organ in man, establishes a neuron circuit between the sexual organs and the nasal and auditory apparatus. He locates the dominating vasodilator center in the medulla with subordinate centers in the spinal cord. This medullary vasodilator center establishes relationship through intercalated neurons with somatic and sympathetic efferent neurons of the various cranial nerves, thereby reaching various parts of the head.

Fleiss, of Vienna, in 1895, in a treatise on the nose and female adnexa pointed out the genital spots in the nose and showed that application of a cocaine solution to these spots would control many cases of dysmenorrhea.

These medullary vasodilator centers depend upon endocrine stimulation, and in the female the ovary contributes the dominating hormone.

The nose and adnexa are similarly constructed, inasmuch as they house the major portions of the cavernous and erectile tissues of the body. It is the reaction of this tissue to endocrine deficiency that serves as a stimulant to the reflexes occurring between these parts.

*Read in Section on Gynecology, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

CHIEF COMPLAINTS

(1) *Headaches.*—One of the commonest complaints in patients is headache. The type of headache to which the gynecologist should pay heed is the recurrent, periodic or menstrual. This symptom, for that is all it is, should not be mistaken for the many other headaches such as migraine, the toxic headaches and the neuralgias. The dreaded so-called premenstrual headache occurs two to three days previous to the onset of menstruation, is described as blinding by the suffering patient, and immediately disappears when the flow starts. While the headache is present the patient is practically incapacitated and is not in any way relieved by the usual headache remedies. Pelvic examination at this time may be entirely negative, but more often there is a cyanosis or vascular engorgement of the cervical mucous membranes, as well as of the vulva. When menstruation starts it is scanty and it usually continues to be so unless the proper treatment is prescribed. The metabolic rate is low, as is also the systolic blood pressure. A subnormal temperature is present and the patient is depressed mentally and in all other respects these cases suggest a lessened activity of the ovarian hormone.

(2) *Nasal Obstruction.*—The nasal turbinates are considered by many the highest secondary sexual organs of the body. They reflect the processes experienced by the adnexa. During menstruation they engorge and often bleed at the onset or sudden termination of the flow, and their erectile tissue furnishes the sanguinous discharge of the so-called vicarious menstruation. During pregnancy this engorgement is maintained for the first three months and during this time any surgical attack upon the turbinates should be prohibited for fear of interruption of the pregnancy.

The genital spots of the septum are composed of similar erectile tissue though only rudimentarily found in man. Hence, their action simulates in a lesser degree that of the turbinates. Excessive or unsatisfactory sexual influences will produce a chronic engorgement of this erectile tissue and serve as a predisposing cause of acute rhinitis. If this same condition occurs in a patient subject to sinus disease the nasal obstruction often favors an exacerbation of the sinusitis. In a recent case the rhinologist at a consultation held out for a diagnosis of pregnancy against a pelvic tumor and based his contention upon the above condition of excessive nasal congestion. In the absence of a pregnancy this engorgement of the turbinates

may signify an ovarian secretory deficiency. In the former the ovary is physiologically at rest, and in the latter the deficiency is probably pathological.

(3) *Obstruction of the Eustachian Tube.*—By far the largest group of cases searching for relief from the otologist, who should most certainly be under the care of the gynecologist, belong in this classification. Their chief complaint is, first, an itching deep in the ear due to an infiltration of the mucous membrane lining the Eustachian tube. Later this condition progresses to a conscious obstruction of this tube with deafness and a feeling of fullness in the ear. The absence of *tinnitus aurium* rules out any general toxic cause and eliminates the auditory nerve as a factor. This same infiltration affects the semi-circular canals and when one side is depressed more than its mate, vertigo is produced. This can be shown either by the Baranay test or by the use of the control galvanic stimulation of the labyrinth and its nerve. Four distinct cases of severe vertigo are now under my care, in patients who sought relief from the otolaryngologist. All of these were in time recognized as sufferers from ovarian deficiency.

PELVIC PATHOLOGY

Pelvic examination in our experience reveals one of three findings. It may be entirely negative. There may be only a slight cyanosis of the cervix and external genitalia. Most important is the so-called fibrosis uteri. On bimanual examination this uterus is often smaller than the normal, it has a distinct non-resilient woody hardness, is freely movable and non-sensitive. Menorrhagia is the predominating symptom here and is sometimes profuse despite the ovarian deficiency. This bleeding is probably due to the loss of elasticity in the vessel walls as shown by a routine pathological report taken from the laboratory at the Methodist Hospital on one of a series of our cases. The cases of true fibrosis uteri present the picture of a chronic fibrosis myometritis. Eighty-five per cent of cases are seen in women who have borne children.

Gross examination of a uterus in a typical case shows a very tough uterine wall. There is no doubt that subinvolution has been present and that the excessive amount of bifrous tissue has prevented a proper retraction of the muscular fibers. In addition to this there is a definite degeneration of the muscle fibers into fibrous tissue, and a definite proliferation of fibrous tissue cells. There is a typical change in the small blood vessels consisting of a marked fibrosis of the media, which causes the cut end of the vessels to project from the cut surface of the myometrium. Sometimes these small vessels are plugged with thrombi, but more frequently there is a definite endarteritis, not infrequently going to the obliterative change.

The endometrium is usually thickened to about one and a half or two times its normal thickness, with or without glandular hyperplasia. There is practically always a definite small round-celled infiltration in all the layers of the uterine wall. Microscopical examination shows little or nothing beyond confirmation of the changes seen by gross examination.

TREATMENT

Treatment of this group of cases after diagnosis is complete, is often most favorable and easy. Our method has been to put the patient on theelin given hypodermically daily for at least a week to ten days. The effect on the head symptoms is almost immediate and the patient often expresses complete relief after very few treatments. On examination by the otolaryngologist there is also found complete absence of all engorgements of mucous membranes under observation. We have not as yet seen any immediate results from capsules or tablets containing the ovarian extract in dry form taken by mouth, the pharmaceutical houses to the contrary notwithstanding. Thyroid extract in cases where there is a very low metabolic rate has proven a valuable adjunct to the above treatment. One-half grain every four hours for a week to ten days is usually sufficient. The duration of treatment should depend upon the severity of the symptoms and the definite history of beginning ovarian deficiency. Cases recognized late are much harder to relieve.

Unfortunately the menorrhagics with engorgement of the cranial mucous membranes do not all respond to the above conservative treatment. X-ray and radium, which further decrease the ovarian output, have often made the cases worse. In our severe cases where the bleeding has continued despite all efforts, a hysterectomy is necessary. The ovaries are always left *in situ* with as good blood supply as can be obtained, for their secretion may still be activated by the conservative means mentioned.

CONCLUSIONS

(1) Many cases of ovarian hypo-secretion seek relief from the otolaryngologist.

(2) These cases, when recognized, should be referred immediately to the gynecologist.

(3) The early diagnosis is important, as then the treatment is most simple.

DISCUSSION (*Abstract*)

Dr. Raymond Hume, New Orleans, La.—In the differential diagnosis, from the otolaryngological standpoint, we simply attempt to determine whether there is intranasal pressure. It is my practice, when I have cases of intranasal pressure which show no sinus disease, to refer them to the internist or gynecologist.

Further study of the recent work has certainly extended the treatment from the laryngological standpoint. There is outlined a treatment of fifth nerve pain from the standpoint of gynecology, and it would bear out our anatomical findings. For many years we cocainized the sphenopalatine ganglion for the relief of pain, but we expected a return. It is my practice in these cases, regardless of the etiology, to cocainize the canal and apply some mild irritant to the area of the ganglion. This is followed by marked reaction, usually vasomotor in character: sneezing, discharge from the nose, and burning pain, at the first treatment, usually an exacerbation of the fifth nerve pain. We repeat this the second and third days, and thereafter four or five times. Of course, that is supplemented by removal of the cause.

Dr. Wood (closing).—When visiting the otolaryngologist the patient naturally does not give her gynecological history, as she is of the opinion that her symptoms are due to postnasal or Eustachian tube abnormality. If the nurse or physician in charge would take a brief gynecological history, it would help greatly in making a correct differential diagnosis.

IS CONSERVATISM OR AN EXPECTANT POLICY THE BEST COURSE IN THE TREATMENT OF FEBRILE ABORTIONS?*

By C. JEFF MILLER, M.D.,
New Orleans, La.

I have had the good or the bad fortune, whichever you may choose to call it, to live through both periods in the treatment of febrile abortion. Twenty years ago practically everyone preached and practised the radical treatment. Today I, like most of my fellow gynecologists, preach and practise conservatism.

I take it that we may classify as septic every patient who has had any sort of intrauterine interference, though we are, unfortunately, not yet agreed as to the exact clinical criteria of sepsis. For my own part, I believe that any woman who has an elevation of temperature over 100° twice within twenty-four hours or for more than twenty-four hours should be considered at least potentially to be septic, if her fever cannot positively be attributed to other causes. We heighten our reported morbidity, I admit, by setting down that criterion, but we increase our patients' safety.

Puerperal infection is precisely the same as post abortal infection, the difference being only that one occurs after a full-term and the other after a more or less early pregnancy. Both of them are wound infections. They differ in no respect from a wound infection of any other part of the body. The same type of bacteria must be fought, the same possibilities of extension to other tissues and to the blood stream must be recognized and guarded against. As a matter of fact, the potentialities for harm are rather greater than they are in other varieties of wound infection for the reason that the lymphatic and venous channels of the pelvis offer routes for ready extension, and for the reason that the tissues of the birth canal, after they have been subjected to the physiologic and pathologic changes incident to the birth process, offer a fertile field for bacterial growth.

Bearing those things in mind, is the radical treatment of any type of abortion justified? I do not believe that it is. The septic abortion is usually the criminal abortion, as you know, and we see these patients not immediately after they have been tampered with but days later, because they are bleeding, or because they have fever. They are frequently in a state of secondary anemia; they are frequently more or less toxic; they may have extrauterine complications, such as parametritis and peritonitis; and there is always the possibility of perforation of the uterus. We are dealing with patients who are either gravely ill or who may be gravely ill; we must not forget that very often we owe to our own misguided efforts the conversion of a simple abortion into a serious and perhaps fatal illness.

The basis of treatment is non-interference. We put these patients to bed, where they can have fresh air and sunshine in abundance. We nourish them well, with repeated small meals of high caloric value. We see to it that they get fluids by hypodermoclysis or infusion if they cannot or will not take enough by mouth. We relieve their pain by sedatives, opiates, hot and cold applications. We reduce their fever by ice caps and sponge baths, rarely by antipyretics.

*Read in Round Table Discussion Session, Section on Obstetrics and Section on Gynecology, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

In short, we build up their strength by every possible method in our armamentarium. But locally, we let them absolutely alone with just one exception, if free bleeding demands interference. If the uterus is well contracted and the cervical os closed, there is no point to entering the uterus, no warrant for doing it, and interference is a criminally dangerous procedure. Even if the patient is bleeding, active measures are not necessary. If the cervical os is patulous and debris is protruding from it, the fragments are gently removed with the sponge-forceps, or, better, with the gloved finger, but the curette is never under any circumstances employed in fresh abortions; for that matter, it might as well be relegated to the museum, as far as its use in obstetric practice is concerned, for it has no place in it. When the visible debris has been removed, the patient is given pituitrin and ergot, at regular intervals, to hasten uterine contractions, and if bleeding is free a vaginal pack is also inserted, which likewise hastens the process. I have lived through a rather long medical experience and I still believe, without qualification, that the vaginal pack, aided by pituitrin, will check bleeding as no other method will and with a degree of safety no other method offers.

Remember that while the proper drainage of the uterus is essential, drainage is not secured by mechanical means. Remember that while curettage may serve to remove superficial debris, actually it removes also the protecting barrier which nature has set up against further invasion and it lays open to fresh infection gaping sinuses and lymph channels. Study the pelvic process by repeated vaginal examinations made under aseptic precautions; for pus collections, if they develop, should be opened by simple puncture, depending upon where they point. Otherwise refrain from active treatment, at least until the subsidence of the fever makes it clear that active infection is past. Then and only then may the uterus be safely invaded, and the longer active treatment is delayed the better will be the outlook for the patient.

Supportive measures, as I have said, are the bedrock of our treatment. Sera and vaccines are perfectly useless. Intravenous therapy is futile and exceedingly dangerous. Milk injections, however, fall into a different category; they are very valuable in the case which has reached the chronic stage, in which the exudate is extensive, but they must be combined with the measures I have already outlined.

DISCUSSION (*Abstract*)

Dr. E. P. Allen, Oklahoma City, Okla.—Do you still treat your incomplete abortions as you did some years ago?

Dr. Miller.—I have not changed my policy in any way. I still believe that the treatment of febrile and non-febrile cases alike should be a policy of therapeutic nihilism, as it were, the institution of supportive measures, combined with absolute rest, and abstinence from local treatment other than the removal of accessible debris and the application of a vaginal pack when it is indicated. A non-septic case can be converted into a septic one by even vaginal maneuvers, no matter how carefully they are done.

I stand firm in this policy, and I am supported by the results achieved on our service at Charity Hospital, where we handle the worst types of criminal abortion by these methods. We lose patients, of course. I do not mean to suggest that we cure them all, but we do cure a great many we might reasonably expect to lose, and for my own part I am convinced that a death which occurs under the conservative treatment we advocate could not be prevented by any type of treatment.

THE INTERRUPTION OF PREGNANCY BEFORE THE CHILD IS VIABLE*

By J. C. Ayres, M.D.,
Memphis, Tenn.

The question of the interruption of pregnancy before the child is viable is so complex, bringing into consideration so many problems of sociology, economics, law, health, life and even religion, that the conscientious physician approaches it with fear and dread. The responsibility is ours, and face it we must. But by facing it together we have the advantage of numbers, and hence this paper will be a digest of sixty-two replies to the following questions, sent in by as many obstetricians from all over the South.

QUESTIONNAIRE

A. Do you believe that we are justified in terminating pregnancy before the child is viable:

(1) For social reasons (to prevent disgrace)?
(2) For economic reasons (poverty)?
(3) For health reasons (life not involved)?
(4) To save the mother's life?
(5) Where the pregnancy is the result of rape?
(6) For dominant hereditary taint in one or both parents?

*Read in Section on Obstetrics, Southern Medical Association, Twenty-Fourth Annual Meeting, Louisville, Kentucky, November 11-14, 1930.

B. Would you terminate pregnancy for the following conditions:

(1) Tuberculosis?
(2) Diabetes?
(3) Valvular heart disease?
(4) Nephritis?
(5) Pernicious anemia?
(6) Cancer of the uterus?
(7) Acute yellow atrophy?
(8) High blood pressure?
(9) Placenta previa?
(10) Abdominal pregnancy?

Realizing that an unequivocal yes or no is impossible for some of these questions, I have compiled the answers under four heads: yes, no, yes and no (conditioned) and question (undecided).

The summaries of answers to each question with noteworthy comments follows:

A (1). *For social reasons (to prevent disgrace)?* Yes, 10; no, 51; yes and no, 1. Total, 62.

Comments.—"Depends on conditions known to the doctor." "No longer disgrace to have child out of wedlock." "Yes, under exceptional circumstances." "Yes, this time and age." "Depends, yes and no." "Law and custom; cannot risk secret abortion and one done in a hospital defeats its purpose." "What is more of a disgrace than murder?" "Yes," without comment. "Occasionally justified." "Suppose it were your own daughter?"

It is rather interesting to note that, of the nine men answering yes to the question, seven felt that they should justify their stand by comment. Of course the last comment does not apply, for a father might commit a crime to protect his child; but that would not justify it.

A (2). *For economic reasons?* Yes, 6; no, 56. Total, 62.

Comments.—"Not thus far, but believe in the near future prevention will be perfected and used." "In many cases, yes." "No. Sterilization of one or both parents." "I believe poverty is a sound reason for terminating pregnancy and to be frank with you, it has swayed me in the past though I have been hypocrite enough to assign other reasons on the hospital records. However, I have not done this except where there have been three living children."

As this paper has nothing to do with the question of prevention of pregnancy, I shall note only a few of the comments along that line. The above remark is given because it acknowledges what we all know, that at present there is no perfect preventative against pregnancy.

The third comment is certainly startling, for it would hardly occur to many of us to sterilize a person simply because he was broke. Before we cast stones at the honest brother who falsified the hospital records let us be sure that we have never interrupted pregnancy for insufficient reasons.

A (3). *For health reasons (life not involved)?* Yes, 22; no, 37; ?, 3. Total, 62.

Comments.—"In many cases." "Do not understand." "If reasonably certain health will be impaired." "Special cases." "In some cases." "Usually no, occasionally yes." "Two much chance for malingering." "Chronic conditions, yes." "In exceptional cases." "Yes, both mean shortening of life." "Yes, if tuberculosis is present." "Depends on conditions." "Only in selected and very carefully selected cases"

I realize that this question is ambiguous for every pregnancy and labor risks a life and bad health shortens (?) it; but there are conditions that are more apt to cause morbidity than mortality.

A (4). *To save the mother's life?* Yes, 61; no, 1. Total, 62.

Comments.—"Because the Commandment of God says, 'Thou shalt not kill.' There is no age or age limit mentioned. If a child is not viable, the uterus will empty itself (?); and who shall have the right to say who can live and who shall not live merely because he has been given an M.D.?" "When you empty the uterus are you sure this woman will continue to live? I have seen many prepared for therapeutic abortion and carried to term by a more competent man."

Of course, we all know that the Roman Catholic Church teaches that the abortionist not only destroys the life of the unborn but keeps its soul out of Heaven, the latter due to its lack of baptism. Dr. J. T. Nix, in his book, "The Unborn Child," states that if the physician sees that an abortion is inevitable, he should pass a catheter through the cervix and baptize the embryo through that! The theory of the sixty-one who answer yes to this question is that they are not killing a human being, but that they are preventing the more precious of two from dying.

A (5). *Where the pregnancy is the result of rape?* Yes, 36; no, 20; yes and no, 1; ?, 5. Total, 62.

Comments.—"Yes, with sufficient proof." "(1) by violence, yes; (2) statutory, no." "Debatable; probably yes." "Provided the rape is not questionable." "If there is ample proof." "Had two cases, convinced by evidence that pregnancy was likely a probability before the rape took place." "Undecided." "Yes, if done immediately." "In certain cases, yes." "No, unless unmarried." "Personally I would not. Would not sit in judgment on any doctor who did." "Knew of one case done at once with consent of court."

A (6). *For dominant hereditary taint in one or both parents?* Yes, 21; no, 34; yes and no, 1; ?, 6. Total, 62.

Comments.—"Yes, if proven." "With reservations."

"Doubtful." "In some cases of certain types." "Yes, with sterilization." "No, except epilepsy." "Yes, in case there have been defective children." "Very rarely." "No, treat the child." "Yes, depending on taint." "Think justifiable but not always permissible." "Questionable. If curable, no."

All of the foregoing questions, of course, presupposed that the woman was pregnant when she consulted the physician and did not take into consideration church law, state law, hospital rules or customs. I wanted, and think I received in most part, the opinion of the answers as to justification based upon their sense of duty to humanity.

There is a variety of answers from the lone obstetrician who would not empty a uterus to save the mother's life to the one who answered yes, without comment, to every question.

Sixty-one obstetricians stated that they would empty the uterus to save the mother's life. Those answers inspired the asking of Group B questions. Some of the physicians seemed to think that all of these questions are answered under Section A, Question 4; but a little closer study will show that some of the conditions mentioned are aggravated by pregnancy, some grow better and some are uniformly fatal.

B (1). *For tuberculosis?* Yes, 42; no, 12; yes and no, 1; ?, 6. Total, 62.

Comments.—"Only rarely." "Ordinarily yes." "Yes, if ordered by competent internist." "If active, yes." "Recent reports indicate that tuberculosis is not made worse by pregnancy." "If active or laryngeal." "If advanced or active." "After medical advice." "Only if mother will not live until term." "Yes, but not after four months." "Yes, after seven and one-half months." "Not in early stage." "Not in late stage."

Bar, the French obstetrician, believes that pregnancy has unfavorable effect on tuberculosis. In determining the method of procedure he uses tuberculin. If the reaction is weak he aborts; if strong, he does not.

Rist believes tuberculosis aggravated by pregnancy but not improved by abortion.

Pankow and Seigert believe in early abortion; and Gross believes the same, but after three months' treatment.

Norris advises emptying the uterus prior to the fifth month, if becoming active or if laryngeal involvement. Curettement before the sixth week, vaginal hysterectomy later.

De Lee says that

"if tuberculosis of the lungs is manifest early in pregnancy, if there are fever, wasting, many bacteria in the sputum, hemoptyses, and advanced consolidation, that is, the process seems to be florid, abortion should be induced without delay. If the process seems chronic, especially if the patient comes in the second half of pregnancy, it is justifiable to wait and watch closely."

Williams: "For years I held radical views upon this subject, but in 1926 I was forced to reconsider them as a result of a study by Bridgman and Norwood of 134 cases from my service. These patients were followed for one year or longer and at the end of that time it was found that more deaths had occurred among those upon whom abortions had been induced than in those who had been left alone. I hesitate to induce abortion except under unusual conditions, but I occasionally do so when competent experts assure me that intervention offers the only hope for the patient."

B (2). *For diabetes?* Yes, 27; no, 13; yes and no, 2; ?, 20. Total, 62.

Comments.—"Not ordinarily." "Depending upon the gravity." "Yes, if ordered by internist." "Not if controllable with insulin." "Diabetes improves late in pregnancy." "For aggravation only." "Yes, but not routinely."

De Lee: "Owing to the introduction of insulin and the advance in dietetics, the treatment of diabetes complicating pregnancy has undergone complete revolution. It is now my invariable practice to obtain the advice of an internist. Obstetric treatment is instituted when the disease proves rebellious to medical."

Williams: "In general, the prognosis is better in women over thirty years of age than in young primipara, and it has been only in the latter that I thought interruption of pregnancy advisable; and even then death sometimes follows."

B (3). *For valvular heart disease?* Yes, 30; no, 24; yes and no, 2; ?, 6. Total, 62.

Comments.—"Not ordinarily." "Ordinarily no, depending upon gravity." "Perhaps." "Not if compensated." "Watch carefully." "Subject to internist." "Yes, if compensation broken." "Termination causes more strain than if left alone." "Developing during pregnancy, grows worse." "Very difficult to answer." "No; have carried to term myself." "No, except mitral stenosis." "Carry to term by cooperation with internist."

De Lee: "Consider (1) the nature of the cardiac lesion, (2) the degree of compensation, (3) the reserve force of the heart, (4) the conditions of the organs in the body, (5) whether obtaining weak though live child is worth the permanent damage to the mother, (6) the age of the patient, (7) her pariety, (8) her desire for children and her religion, (9) the advent of acute endocarditis."

Williams: "Occasionally a break in compensation occurs, associated with such signs of serious myocardial or endocardiatic involvement that the artificial interruption of pregnancy seems to offer the only means of averting a fatal outcome."

B (4). *For nephritis?* Yes, 38; no, 18; yes and no, 3; ?, 3. Total, 62.

Comments.—"Not always." "In severe cases." "Subject to advice of the internist." "If progressive damage to kidneys." "If it does not clear up under appropriate treatments." "Yes, chronic nephritis is made worse by pregnancy." "Only after seven months." "If accompanied by high blood pressure."

De Lee: "My opinion agrees with those who hold

that the injury to the kidneys which is inevitable before the child becomes viable; and, too, the poor chances of the fetus in any case make the progress of pregnancy precarious and useless."

Williams: "In view of the ultimate danger to mother and the comparatively poor chances for the child, I have become more and more radical in the treatment of pregnancy complicated with chronic nephritis."

B (5). *For pernicious anemia?* Yes, 40; no, 17; ?, 5. Total, 62.

Comments.—"Depending upon degree." "Subject to advice of internist." "Try to carry her over." "Questionable." "No; treatment too satisfactory."

De Lee: "Pernicious anemia is aggravated by frequent child-bearing and labor is liable to be followed by exhaustion, coma and death. If diagnosis of leukemia is made, pregnancy should be terminated."

Williams: "When pernicious anemia occurs during pregnancy, interruption should be considered only if the condition of the patient becomes alarming; but in such cases the rapid improvement after delivery is very striking."

B (6). *For cancer of uterus?* Yes, 35; no, 17; yes and no, 4; ?, 6. Total, 62.

Comments.—"Some reservations." "Rarely." "Disregard pregnancy, employing treatment best calculated to cure." "If in curable stage, yes; late, no." "Depends on stage." "No, because prognosis is bad, anyway." "Early pregnancy, early cancer, yes. Advanced pregnancy, advanced cancer, no." "Yes, and hysterectomy." "Terminated by radium, early; cesarean late." "Yes, after seven months." "Delivered by abdominal."

De Lee: "If operable cancer of cervix is discovered early in pregnancy the radical operation should be done. Recovery possible in 20 per cent of cases. If near viability, wait."

Williams: "If the cancer has not extended beyond the cervix, immediate abdominal hysterectomy should be performed in the hope of effecting a cure. On the other hand, if the case is inoperable, gestation should be allowed to continue in the interest of the child and cesarean performed at term."

B (7). *For acute yellow atrophy?* Yes, 48; no, 6; yes and no, 2; ?, 6. Total, 62.

Comments.—"Yes, generally no avail." "No; no advantage to be gained." "Yes, but would be useless." "Questionable." "If advanced, yes." "Depending on the toxemia."

De Lee: "In all cases the pregnancy should be terminated as soon as the diagnosis is made. Have seen one case survive."

Williams: "If occurring during pregnancy the uterus should be emptied as rapidly as is consistent with the safety of the patient."

B (8). *For high blood pressure?* Yes, 24; no, 26; yes and no, 4; ?, 8. Total, 62.

Comments.—"If not amenable to treatment." "Yes, if conservative measures fail." "Not necessarily." "Not within certain limits." "This depends upon accompanying findings, not moderate hypertension." "Dependent on type, conditions of kidneys and cardiac muscle." "Yes, if due to pregnancy." "Essential hypertension uncomplicated with nephritis, no." "Only a symptom. Would depend on its cause." "Yes, when associated with other signs of toxemia." "Only if it does not respond to conservative (modified Straganoff) treatment."

De Lee: "There is no essential hypertension. If pregnancy has not advanced to viability of the child the conservative plan is chosen, but if symptoms become aggravated, radical measures."

Williams: "If the blood pressure continues to rise, the albumin urea to increase, and the changes in blood chemistry to become more pronounced, labor should be induced by means of the bougie. If primipara with intact cervix, hysterectomy, under local or spinal."

B (9). *For placenta previa?* Yes, 35; no, 19; yes and no, 2; ?, 6. Total, 62.

Comments.—"Yes, if not under supervision in hospital." "No; cesarean section at term." "Some cases." "Depends on amount of bleedings." "Not necessarily." "Central previa, with severe hemorrhage, yes." "Unsolved question." "Watch; carry as far as possible and do a section." "Yes, where there is a positive diagnosis." "Yes, after seven months."

De Lee: "With two exceptions every pregnancy complicated with placenta previa should be terminated, when the bleeding is slight and when the fetus is near viability."

Williams: "On account of the danger of profuse hemorrhage, pregnancy or labor, as the case may be, should be terminated as soon as possible after a diagnosis has been made."

B (10). *For abdominal pregnancy?* Yes, 46; no, 11; yes and no, 3; ?, 3. Total, 62.

Comments.—"If gotten before the fifth month." "Except for control of hemorrhage these cases have done better after death of fetus." "Providing the abdominal pregnancy is diagnosed in the earlier weeks or months before the end of the third month, I would terminate pregnancy." "If it has advanced to near twenty-eighth, no particular advantage, as much safer after the baby and placenta dead." "Yes, at once." "Would attempt to wait until the child is viable." "At term if not discovered early." "Do not consider fetus."

De Lee: "There is no expectant treatment for a growing ectopic gestation. It is best to interfere as early as possible and not wait for the child to be viable."

Williams: "When the child has attained viability, certain authorities urge the propriety of deferring the operation a few weeks in its interests. While such a course is inadvisable, it may be permissible in exceptionable cases, provided the dangers are explained to the patient and her family and accepted by them."

On casual reading it seems that the student of these varying ideas, ranging from the religious zealot, with his absolute disregard of the mother and those dependent upon her, to the materialist who thinks that an unborn child has no rights, would be lost in a morass of conflicting opinion. A more careful study of the figures and comments will, however, convince him that he can draw very definite conclusions from them.

The baby has a very positive and definite right to life, unless the continuance of that life actually and seriously endangers the more val-

uable life of the mother. It is evident that a small majority of our answers consider the development of pregnancy following rape worse than death.

Our decision as to when, in a given case, the mother's life is endangered must be based upon the answer to these questions:

(1) Does the developing gestation cause or aggravate this particular condition?

(2) Will the further development of the pregnancy actually and seriously, despite the medical treatment, endanger the life of the mother?

(3) Will the interruption of pregnancy save the mother's life?

(4) If the condition is hopeless as regards the mother, will non-interference of the pregnancy save the child?

Rongy quotes Napoleon as answering the physician who asked him whether if, matters came to an extremity, he should save the mother or child, replied: "The mother; it is her right." True, gentlemen, but also remember that every woman has the right to be the mother of a living child.

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Medical Arts Building

DISCUSSION (*Abstract*)

Dr. J. R. Reinberger, Memphis, Tenn.—I shall confine myself to the indications from purely a medical standpoint, as this question arises in a large teaching service.

We feel that in placenta previa the pregnancy should be terminated as soon as the diagnosis is made. If there is any doubt, the cervix should be instrumentally dilated and the pregnancy terminated if the placenta is found over the cervix. We base this opinion upon the fact that two patients have been lost from watchful waiting. I observed a third death from waiting, on another occasion while I was resident obstetrician on a large service in New York City.

We feel that if a case of chronic nephritis does not improve with the usual lines of treatment, and more so if the patient has living children, the pregnancy should be terminated by abdominal hysterotomy with sterilization. This is for the purpose of conserving the mother's energy and life to care for her family.

We have never encountered a case of pernicious anemia associated with pregnancy. Heart disease has never been an indication to date. However, if a patient presented herself and had had marked decompensation during her past pregnancies and it was thought likely that the same condition would occur, she would be aborted, preferably by the method suggested by Irving, of Boston. Most of the cases that we have seen are carried to term with medical treatment and delivered rapidly, or we do a cesarean section with sterilization to avoid future pregnancies, if the condition is desperate.

So much has been written upon the treatment of tuberculosis in pregnancy that it is almost impossible to draw conclusions regarding the proper management. Only yesterday a paper was read upon its conservative treatment; and still our own mortality is comparatively high when we follow this dictum. I personally feel that in incipient tuberculosis or an arrested case of less than two years' duration, a therapeutic abortion should be done, preferably under morphine and scopolamin narcosis or combined with local anesthesia. Inhalation anesthesia in the past in tuberculous women has been responsible for some of the mortality.

There is no question of doubt in my mind that insulin has been a life-saver in diabetes associated with pregnancy, but in a very small group of cases many of these patients are requiring a more rigid diet and are taking larger doses of insulin than they required before their pregnancy. Therefore, we cannot say that pregnancy is without deleterious effects.

The second division of Dr. Ayres' paper was classified as the social indications for the interruption of pregnancy. I feel that we should approach this field with an open frame of mind and not be influenced by the general attitude of the medical profession in the past. I remember distinctly how the first meeting of the New York League for Birth Control created a furor. The medical profession immediately and wisely took cognizance of the situation and joined this group in an attempt to supervise this social and economic medical problem. It appears to me that the question of abortion confronting the individual medical practitioner is becoming lessened each year by the widespread use of contraceptive devices.

I am in accord with the generally accepted principal that therapeutic abortion should be done where rape has been proven by law. We have never performed nor considered an abortion for economic reasons, but we are in sympathy with the women who are confronted with this trying problem. But just as with most of the profession, although not acknowledging it, we are constantly hoping that contraceptives will lessen the number of these embarrassing consultations.

Illegitimacy has been a hobby of mine for about ten years. In our prenatal clinic an opportunity was given to study all the girls going through the homes for delinquency and they were given a mental rating by the use of the Binet-Simon psychologic test. It was found that many of these young girls had a low mental rating, and it was likewise observed that many of them returned for their second and third, or even fourth pregnancies.

What is wrong with this method of handling this problem? Illegitimacy for the most part is being handled from the standpoint of more or less pure philanthropy; and it certainly cannot be denied that a great deal is being done for these unfortunates. But provisions will have to be made by legislation in order to reduce the

overwhelming numbers that are accumulating each year in such homes. Maybe segregation of those who are absolutely mentally incapable, and possible sterilization of those only partially capable of restraining themselves, would aid in the solution of the problem. The high-grade mental illegitimately pregnant young woman is rarely ever a burden in that the community abortionist is visited or financial assistance sends her away to a distant location for proper delivery and adoption of the baby and she returns to her home without a blemish on her character.

I question whether our average present management of illegitimate pregnancies profits anyone, as the disgraced mother usually is sent back to her home town with a scarlet letter to fight an almost impossible battle to regain her moral status in the city whence she departed, to say nothing about her child. Likewise, I do not believe that abortions would increase the illicit relationships, as suggested by many.

In certain types of hereditary taints, I do not believe it justifiable to advise the family to bring into the world children with this possibility and would abort such cases as congenital deafness, epilepsy and insanity, etc.

In closing I feel positive that there is no desire on the part of any student of medicine to become a legalized abortionist. Williams states: "The doctor after all has to use his own judgment and conscience in certain cases." This statement does not clarify the situation. He is a man of unusual prominence who is able to make laws unto himself. After all discussions, unless the medical profession at large makes a definite analysis, the rank and file of the profession must oftentimes be guided by a narrow, unintelligent decision.

Dr. Edward Speidel, Louisville, Ky.—I happened to be one of those who answered Dr. Ayres' questionnaire; and the only case in which I advocated interruption of pregnancy was in rape. To bring this vividly to your mind, I think there is not a physician in the audience who would hesitate to interrupt pregnancy in the case of a woman who was raped by a negro. I feel that in such circumstances the woman should not be allowed to pass through the nine months of gestation and then bring up the unwelcomed human being left to her. I make this a special point to bring out what we are teaching the students in the University, which is that in most instances the Catholic Church does not interfere with the interruption of pregnancy after the child is viable. After twenty-eight weeks the child is viable. If you remember, there are rare conditions which occur before the twenty-eighth week that really necessitate interruption. Placenta previa rarely occurs before twenty-eight weeks have passed; and if it should, with safe measures the patient should be carried to that period and then there is no objection to interruption of the pregnancy. This should be borne in mind.

When it comes to interruption of pregnancy for disease I think we are in a comfortable position. No specialist in obstetrics should think that he has sufficient knowledge to decide such a question in tuberculosis, diabetes, nephritis, and so on. He should decide this in consultation with an internist and then the responsibility is divided. In interruption of pregnancy for obstetrical complications, abruptio placenta, placenta previa, and so on, this step is always indicated.

In cancer of the cervix, unfortunately this almost always occurs in the more ignorant individuals, and when you see them the condition is too far advanced to save the patient. I think they should be allowed to go on to term and be delivered by cesarean section.

Dr. R. A. White, Asheville, N. C.—Recently there has been passed a law in North Carolina permitting the sterilization of the feeble-minded or mentally defective women. If sterilization is indicated, interruption of pregnancy should also be indicated.

In our experience the patient with a mitral stenosis is a better risk than the patient with other valvular lesions. But a beginning break in compensation in these cases is an indication for terminating pregnancy.

The chronic nephritic with hypertension often shows an increasing rise of blood pressure with each succeeding pregnancy as pointed out by Dr. Adair and by the essayist. Therefore, the number of pregnancies the woman has gone through should be a great factor regarding therapeutic abortions.

The large class of secondary anemias present many problems aside from the dangers to themselves. Their babies, as a rule, are not up to par. We have found blood transfusions during the latter part of pregnancy to be of great value.

Dr. Ayres (closing).—I did not have time to add my own conclusions, but shall do so now. I agree with the majority in that only at the time of imminent death should the pregnancy be interrupted. The diseases mentioned were selected because they were of different types. It is probable that in chronic nephritis in the early months of pregnancy it would be wise to terminate the condition. In acute yellow atrophy the consensus of opinion is that we should go ahead and interrupt the pregnancy, but that it would not do any good. This seems to me a little irrational. I think De Lee's statement that he has seen one patient get well means about one out of 1,000.

In the heart cases, I think if the patients are cared for in bed and treated throughout as heart cases should be treated, with cesarean sections at term, under local or spinal anesthesia, they will do better than under any other method of treatment.

The question of tuberculosis will probably be solved along about this line: during the early months of pregnancy there is a tendency for the condition to become worse until the diaphragm is pressed upon sufficiently to give the lungs some rest. After that, there is a tendency for the patient to improve until the diaphragm drops suddenly, when the latent process flares up again. If we can get these cases arrested before delivery they may get by. If in the early months it seems that it will be impossible to arrest the disease before term, we should interrupt the pregnancy at once.

The goal of obstetric practice is to present a live, well child to a live, well mother.

ABLATIO PLACENTAE*

By JOHN F. LUCAS, M.D.,
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The term ablatio placentae means the partial or complete separation of the normally implanted placenta before the birth of the child and is considered one of the most serious complications that might befall the pregnant woman.

To Rigby,[1] in 1776, credit is given for the differentiation of this condition from placenta previa. He designated the former as accidental hemorrhage and the latter as unavoidable hemorrhage. Goodall,[2] one hundred years later, collected 106 cases from the literature and called to the attention of the profession the seriousness of the condition and the high fetal and maternal mortality existing under the management in vogue at that time. Holmes,[3] in 1901, suggested the term ablatio placentae.

The occurrence of ablatio is more common than most physicians realize. Formerly it was associated with only the severe and tragic cases which commonly ended fatally for both mother and child. More recently ablatio placentae has been recognized as a frequent cause of ante partum hemorrhage and since the mild cases have been taken into consideration its incidence is said to be greater than that of placenta previa.

Goethals[4] reported one in 94 cases at Boston Lying-In; Williams[1] one in 157 cases. and Polak[5] one in 305. Holmes[3] claimed that this condition occurs as a pathological entity in one out of every 200 cases and clinically in one out of every 500 cases. Many of the mild cases are missed unless routine inspection of the placenta is carried out and others are not recorded or recognized, but no doubt account for not a few intrapartal fetal deaths.

The etiological factors suggested in the literature are manifold. The early writers were inclined to believe that traumatism was the exciting factor and no doubt direct blows on the abdomen, falls and violent muscular effort account for a number of the cases reported. Polak[5] laid a great deal of stress upon trauma as the exciting factor in many of his cases, yet trauma was absent in all of Williams'[1] cases and he thinks that its influence has been exaggerated and cannot be regarded as the usual cause of the complication.

Traction upon a short cord or sudden diminution in the size of the uterus in cases of hydramnios or twin pregnancy explains a few cases that occur during labor.

Hyperplasia of the endometrium is classed as a predisposing factor, but probably plays no great part in producing this condition.

Morse[6] has produced in animals placental separation by excessive torsion of the uterus and by ligation of the uterine and ovarian veins on one side. Identical experiments were performed by Polak,[5] who stated that when uterine torsion is marked there is definite blocking of the return circulation which produces minute hemorrhages in the spongy layer of the decidua basalis which loosens the placenta so that with the aid of active uterine contractions separation takes place.

In most cases, however, there is neither trauma nor a mechanical cause, but an associated toxemia resembling pre-eclampsia as evidenced by the presence of edema, albuminuria and hypertension. This suggests a toxic element as the underlying factor, especially in the more severe or tragic cases.

Muus,[7] of Copenhagen, in 1903, advanced the theory that the severe cases which were later described in great detail by Couvelaire and are known in the literature as utero placental apoplexy were due to a pregnancy toxemia and called attention to the frequent association of eclampsia with these cases.

Various writers have reported the presence of albuminuria in from 50 to 85 per cent of their cases.

Goethals,[4] in 1928, reported one ablatio placentae to every 22 toxemias, a ratio of 4 to 15 times the incidence of ablatio placentae as reported in the literature. Williams[1] believes that the toxic element differs from that present in pre-eclampsia and Polak[5] in a recent contribution stated that it was relatively common in the chronic nephritic patient.

Willson[8] believed a hemorrhagic toxin liberated by the placenta, which caused a marked delay in the clotting time, to be the etiological factor, producing its maximum effect locally at the site of the attachment and secondarily producing the manifestations of a general toxemia. Hofbauer[9] recently produced ablatio placentae in pregnant animals by the intravenous administration of histamin and claimed the condition to be due to a lesion in the walls of the capillaries and small veins which allows the plasma and red cells to leave the vessels, producing edema and bleeding by which the muscle bundles of the uterus are separated.

The weight of evidence at the present time indicates the presence of a pregnancy toxemia as the most important causal factor, especially in the severe type of case. As yet its source and character have not been proven and it offers a fertile field for the research worker.

In ablatio placentae the separation may vary from slight to complete detachment. It begins in the decidua basalis by an effusion of blood

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from the walls of the capillaries and small veins, producing at first a retro-placental hematoma and throwing out of function that part of the placenta. If the process stops at this point the condition may be overlooked unless the freshly delivered placenta is inspected routinely. In the cases of clinical interest the process is more extensive, the retro-placental hemorrhage gradually accumulates and further separates the placenta or membranes and distends the uterus, preventing it from contracting down on the bleeding vessels in the decidua basalis. As the membranes become separated from the internal os the hemorrhage becomes apparent. In the concealed type the blood is retained in the uterine cavity and is prevented from becoming apparent by the membranes adherent around the internal os or by firm pressure of the presenting part. All cases are at first concealed, but the majority finally dissect their way between the membranes and internal os and become apparent.

In not a few of the severe cases the uterus, as well as the tubes, ovaries and broad ligaments, presents a characteristic picture which was first described by Couvelaire and termed by him utero placental apoplexy. In these cases there is a hemorrhagic infiltration of the uterine wall, dissociating the muscle fibers and destroying more or less their contractile power. The hemorrhage seems more pronounced in the uterine wall at the site of the placental insertion, but the whole body may be involved. The peritoneal surface has an ecchymotic mottled appearance resembling an ovarian cyst twisted on its pedicle. Endarteritic and degenerative changes with thrombosis of the vessels of the placental site are found. In a few cases reported the peritoneum presented multiple superficial fissures on the surface of the uterus, producing more or less intra-abdominal hemorrhage. In 1919, Dr. Phaneuf,[10] of Boston, reported two cases of ablatio associated with spontaneous rupture of the uterus in which the rupture extended through the peritoneum and muscularis.

Williams[1] believes that the picture of utero placental apoplexy occurs in only the more severe cases, while Wilson[8] states that his own belief is that practically all cases of ablatio will ultimately prove to be caused by the same placental toxin which in extreme cases produces a typical picture of fulminating utero placental apoplexy.

Ablatio occurs during the last months of pregnancy or during labor. The symptoms depend upon the amount of separation and hemorrhage. Many of the mild cases present few symptoms and a correct diagnosis is made only after inspection of the placenta. In the more severe type the onset is sudden with severe abdominal pain in the region of the uterus followed in the apparent type by the discharge of blood, or the external bleeding may be the first sign in the majority of cases. In the concealed type the uterus enlarges with the accumulation of blood and may extend to the ziphoid. Uterine contractions are stimulated, but if the muscle is impaired from the toxic process and hemorrhagic infiltration of its walls, the uterus no longer alternates between contraction and relaxation, but assumes a board-like hardness and becomes very tender and painful. In this type of case it will be impossible to outline the fetal parts or to hear the fetal heart sounds. The patient is anxious, pale, pulse becomes rapid and a condition of profound shock develops out of all proportion to the amount of blood loss. Many of these cases show signs of toxemia, which leads most recent writers to believe that the etiological factor is a toxemia similar to that present in the pre-eclamptic. In mild cases the hemorrhage is usually apparent, the pain less and the ligeneous consistency of the uterus does not always develop nor does the enlargement of the uterus. The fetal heart sounds may be present if the separation is only partial, but as the separation increases the heart sounds become feeble and finally disappear.

The diagnosis is seldom difficult and should be readily made when the patient, usually having had some evidence of toxemia, is suddenly seized with severe abdominal cramp-like pains associated with faintness or nausea and later by evidence of shock. The bleeding is usually apparent or the uterus rapidly increases in size and becomes board-like if the hemorrhage is completely or mostly concealed. Fetal heart sounds are usually absent and there is inability to palpate the fetal parts. On pushing up the presenting part, concealed blood or serum is allowed to escape. It is necessary to rule out placenta previa, in which case the hemorrhage is painless in character, abdomen soft, fetal parts easily palpable and on vaginal touch the placenta is felt in the lower uterine segment,

while in ablatio the finger comes in direct contact with the presenting part. Other conditions only to be mentioned in the differential diagnosis are premature labor, ruptured ectopic pregnancy and threatened uterine rupture.

The prognosis depends upon the early diagnosis and condition of the patient, the amount of separation, blood loss and shock. In severe cases the proximity to a well equipped hospital, availability of donors for blood transfusion, and the treatment instituted are the important factors. Deaths occur from hemorrhage both ante partum and post partum due to atony of the uterus and its failure to contract on the bleeding sinuses or the placental site. Added trauma and shock of delivery account for a large number of deaths. Others die of sepsis and intra-abdominal hemorrhage. Occasionally suppression of urine may be the cause of death. The mortality is higher in the concealed type, as they are not recognized so early, are associated with more shock and the uterine muscle is often impaired. The apparent type is usually seen earlier on account of the external bleeding. The mortality in complete ablatio and utero placental apoplexy is high, ranging from 25 to 50 per cent of cases, but when the partial ablatio and mild cases are included the mortality is materially lowered. Recent statistics showing a mortality of 3.6 per cent[11] and 6.5 per cent[12] are reported. In the severe cases the child is practically always asphyxiated and the fetal mortality varies from 40 to 95 per cent, depending upon the type of cases composing the series reported.

Since many of these cases present evidence of toxemia resembling closely that of toxemia of the latter months of pregnancy, proper prenatal care will accomplish much in reducing the incidence of ablatio, as it has done for the toxemias. The removal of foci of infection in early pregnancy, diet and frequent examination of urine and blood pressure may enable us to prevent many of these cases. As many cases are preceded by trauma, and experimental evidence seems to show that torsion of the uterus will produce the same pathological picture, it behooves us to caution our patients to avoid any violent muscular effort, violent exercise and prevention of accident. They should be taught the dangers of vaginal bleeding and symptoms of weakness and shock occurring during pregnancy so that they will demand immediate medical attention. If these cases are seen earlier more mothers will be saved.

Any patient presenting symptoms of ablatio should be immediately hospitalized and the diagnosis confirmed by vaginal examination under the strictest aseptic precautions. Our first procedure is to treat the immediate symptoms of pain and shock by the administration of morphine and application of heat. The pulse and blood pressure should be closely watched and recorded at frequent intervals. The blood is always typed and a suitable donor obtained. Glucose is given intravenously if the patient is severely shocked or if the pulse is rapid and weak while waiting on the laboratory to match the blood.

The indications in treatment of ablatio include emptying the uterus in the quickest manner possible with the least danger to the mother, the control of hemorrhage from the placental site, combating shock and the restoration of blood loss. In consideration of the method of delivery each case must be individualized. Our decision will be guided largely by the extent of cervical dilatation and the gravity of the case. Mild cases often occur during labor and may be expected to deliver spontaneously. If labor is slow, delivery may be hastened by rupture of the membranes, insertion of the bag, or if the presenting part is well engaged small doses of pituitrin may be given and a tight abdominal binder applied. If labor is not in progress and the bleeding continues, it should be induced. If delay occurs after full dilatation of the cervix the child may be delivered by version and extraction, or by forceps, depending upon the station of the head. Mild cases rarely require packing, but if the uterus does not promptly contract after delivery of the placenta and injection of pituitrin and gynergen, if bleeding continues the uterus should be packed at once. The severe type of case presents a different problem and more energetic measures must be instituted. In many cases we have to deal with an atonic uterus distended with blood and unable to retract on account of hemorrhage separating the muscle fibers of the uterus. The emptying of the distended uterus is always associated with shock, and possible post partum hemorrhage and the combination often proves fatal. If the cervix is fully dilated or easily

dilatable the patient is delivered from below, but preparation must be made in advance for prompt packing of the uterus. If the cervix is not dilated and unprepared for delivery, it is our custom to deliver the patient by cesarean section, and if the uterus does not contract and shows evidence of intermuscular hemorrhage by the presence of ecchymotic areas beneath the serosa, it is promptly removed by supravaginal hysterectomy. This type of uterus can be diagnosed only at operation or at the autopsy table. If the diagnosis is made while the child is still alive and the cervix is not prepared for immediate delivery, one is justified in doing a section in the interest of the child. It is our custom to precede all operative deliveries in bleeding cases by a blood transfusion, and this is especially true in ablatio where we encounter both shock and loss of blood. The blood loss should be restored and transfusion is the ideal treatment of shock, allowing these patients to withstand the operative procedure. A donor is kept available until the patient is out of danger.

Stander,[13] in 1926, demonstrated the similarity of the blood chemistry in the toxemias and that produced by inhalation anesthesia, and since our own observations show that toxic cases do much better under spinal anesthesia, we feel that general anesthesia is contraindicated in operative procedures in cases of ablatio, and spinal anesthesia has been our anesthesia of choice. It has been our experience that the uterus contracts better, and the patient is shocked less, than when general anesthesia is used. Constant observation for several hours after delivery for early recognition of evidence of shock or relaxation of the uterus is required.

CASE REPORTS

Case 1.—Mrs. J. M., age 34, a white primipara, eight and one-half months pregnant, was admitted February 20, 1928, following profuse vaginal hemorrhage. There was acute pain in the region of the uterus, vaginal bleeding, nausea and pallor. Her pulse was 130, blood pressure 130 systolic, 90 diastolic, red cells 2,780,000 with 60 per cent hemoglobin. The urine showed a marked trace of albumin with a few granular casts. The abdomen was soft and the fetal heart sounds were good. The head presented at the pelvic brim, the cervix was closed, and there was no effacement. The placenta was not palpable in the lower uterine segment. Five hundred c. c. of whole blood was given and cesarean section was done under spinal anesthesia. A live male child and a large amount of old blood and clots were found. The placenta, situated on the posterior surface of the uterus, was manually delivered and showed a detached area on its maternal surface 4 inches in diameter. The uterus contracted well and showed no evidence of involvement of its wall. Both mother and child were discharged on the eighteenth day entirely recovered except for a slight anemia on the part of the mother.

This was an elderly primipara with profuse hemorrhage from a partial ablatio placentae associated with toxemia of mild degree, without apparent involvement of the uterine wall. It is an example of an occasional case where section is indicated in the interest of both mother and child.

Case 2.—I. D., colored, para 5, was sent to the hospital on account of ante partum hemorrhage. She was admitted at 9:00 p. m., pulse 120, blood pressure systolic 140, diastolic 90, albumin one-plus, with good contractions every two to three minutes. The uterus was the size of a full term pregnancy. No fetal parts were palpable or heart sounds audible. The head was engaged in the mid pelvis, the cervix completely effaced and dilated to three fingers. The placenta was not palpable. The blood was typed, but a suitable donor was not obtained. A stillborn male fetus delivered spontaneously at 10:30 p. m. The placenta and old blood clots followed almost immediately. The uterus was flabby and was packed at once on account of profuse bleeding. The pulse was 160 and condition critical. One thousand c. c. of 10 per cent glucose was given intravenously and a continuous glucose drip started. The placenta showed adherent clot over two-thirds of its maternal surface. The patient made an uneventful recovery and was discharged on the sixteenth day. This case illustrates the conservative treatment in a rather severe type of ablatio.

Case 3.—Mrs. W. C. S., age 26, a white primipara, was admitted March 30, 1930, in labor at full term, complicated by hydramnios. Her blood pressure was 110/70 and urine normal. It was a vertex presentation. The heart tones were of good quality. The cervix was effaced and for three fingers was dilated. Three hours later the membranes ruptured and contractions were much harder. Free blood came away after each contraction. The heart tones could not be found. The baby was born spontaneously and followed immediately by a gush of blood. The placenta and a large amount of blood clot were manually delivered and uterus packed. The patient was shocked from loss of blood, but responded promptly to glucose intravenously. Recovery was uneventful and the patient was discharged on the twelfth day. This case was evidently due to the sudden diminution in the size of the uterus following the rupture of the membranes.

Case 4.—Mrs. N. G. H., age 29, a white primipara, eight months pregnant, while getting out of bed at 6:00 a. m. had a sudden hemorrhage from the vagina, followed immediately by severe pain in the abdomen which has been almost continuous. She felt very weak and faint, looked anxious, her mucous membranes were pale, and there was profuse perspiration. The uterus was board-like, extended to the ziphoid, and was very tender to touch. The heart sounds were not audible. The blood pressure was systolic 180, diastolic 110. Pulse was 120. The albumin was one-plus. There was

edema of the face, hands and feet. The cervix admitted one finger; there was no effacement. There was head presentation; no placenta was felt. Free flow of blood occurred on raising the presenting part. One thousand c. c. of 10 per cent glucose was given at once. Delivery was by section under spinal anesthesia. Seven hundred c. c. of whole blood was given at the time of operation. There was a stillborn fetus, placenta completely separated, and uterus filled with dark blood and clots. The uterus was markedly discolored with ecchymotic areas over the fundus and failed to contract after brisk massage, injection of pituitrin and gynergen. Supravaginal amputation was performed. The patient had glucose for twenty-four hours. Recovery was uneventful and the patient was discharged on the seventeeth day.

On section, the vessels of the fundus were filled with blood clot, some of the vessel walls were ruptured, and there was an extravasation of blood into the tissues separating the muscle fibrils. There was polymorphonuclear cell and round cell infiltration in the endometrium. The diagnosis was hemorrhagic infiltration of the uterine muscle with thrombosis of the vessels of the fundus.

This was a case of utero placental apoplexy with concealed hemorrhage associated with toxemia and demanded immediate delivery and hysterectomy to prevent fatal post partum hemorrhage.

CONCLUSIONS

(1) Mild cases of ablatio occur more often than is generally recognized, producing little maternal discomfort, but often fatal to the child.

(2) A pregnancy toxemia, the nature of which is still undetermined, seems to be the most common predisposing factor.

(3) Cases vary widely in severity, ranging from small areas of separation with minimum reaction on the part of the mother to complete separation with utero placental apoplexy associated with marked shock out of all proportion to the amount of hemorrhage.

(4) The diagnosis is readily made from the history and physical examination.

(5) Prognosis depends upon early recognition, gravity of the case and treatment instituted.

(6) Treatment must be individualized, depending upon the type of case and the amount of cervical dilatation. Mild cases are treated by conservative means, severe cases vaginally if the condition of the cervix permits. If the cervix is closed, cesarean is indicated and hysterectomy if the uterus remains flabby and does not contract.

(7) If delivery is accomplished by the natural passages, prompt packing of the uterus is often necessary.

(8) Blood transfusion is a most valuable aid in preparing the severe case for delivery, and spinal anesthesia is indicated when toxemia is present in operative deliveries.

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DISCUSSION (*Abstract*)

Dr. H. R. Shands, Jackson, Miss.—Our practice in ablatio is to empty the uterus by abdominal section unless the woman is in active labor. Pare gained immortality by preaching and teaching the principle of surgical approach to the bleeding point and ligature of the bleeding vessel. The prompt securing of an empty contracted uterus is the most effective way in which to control the bleeding associated with parturition.

In the Baptist Hospital in Jackson we have treated in the past nine years nineteen cases of severe bleeding at or near full term with cesarean section. All of these cases recovered.

We have not at all times been able to make a definite differential diagnosis between placenta previa and the bleeding from a normally located placenta. In one or two cases we made a diagnosis of marginal placenta previa and at operation found the placenta normally located.

During these nine years for all causes there have been performed in the Baptist Hospital 124 cesarean sections with four deaths. We think the modern operation of cesarean section comparatively safe.

A report has recently been published from the Lying-In Hospital in Chicago of 140 consecutive cesarean sections with no death. The low operation as described by De Lee possesses many advantages over the classical cesarean section.

Dr. Lucas (closing).—Cases of ablatio vary widely in type. The mild types unquestionably do better when treated conservatively, but the severe type and cases of utero-placental apoplexy will demand cesarean section or supravaginal hysterectomy if the uterus does not contract to stop the bleeding.

Blood transfusion and spinal anesthesia have been of great help to us in the care of these cases.

ROENTGEN PELVIMETRY AND CEPHALOMETRY*

By HENRY JANNEY WALTON, M.D.,
Baltimore, Md.

We are now entering upon a very definite period of progress in the use of the roentgen rays in obstetrical diagnosis.

Until a comparatively short time ago, most physicians considered the roentgen rays contraindicated in all stages of pregnancy, and even today it is not uncommon to find experienced obstetricians who advise against having roentgen examinations made of their patients, in spite of the fact that there is not a single well authenticated case on record where injury to either mother or child has followed the diagnostic application of the rays.

In most instances it is only necessary for the roentgenologist to demonstrate with good, clear roentgenograms the outlines of the fetal skeleton in the uterus and the relationship that the head of the child bears to the pelvic canal to convince the most skeptical of the advantages of this means of diagnosis.

No method of examination has ever been devised that can compare in accuracy with the roentgen examination in discovering the presence of abnormalities or physical defects in the skeleton of the unborn child, or in determining the size of the fetal head before delivery, or of measuring the diameters of the maternal pelvic inlet.

Dr. Thoms, of New Haven, Connecticut, was the first in this country to make roentgen pelvimetry practical. He devised a very simple means of measuring the degree of distortion of the pelvic brim shown on the roentgenogram, and my demonstration this morning is a modification of his method.

I have simplified his technic and have developed a way of measuring the size of the head of the unborn child, which is even more important than measuring the size of the pelvic brim. Unless the obstetrician knows the approximate

*Read in Section on Radiology, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

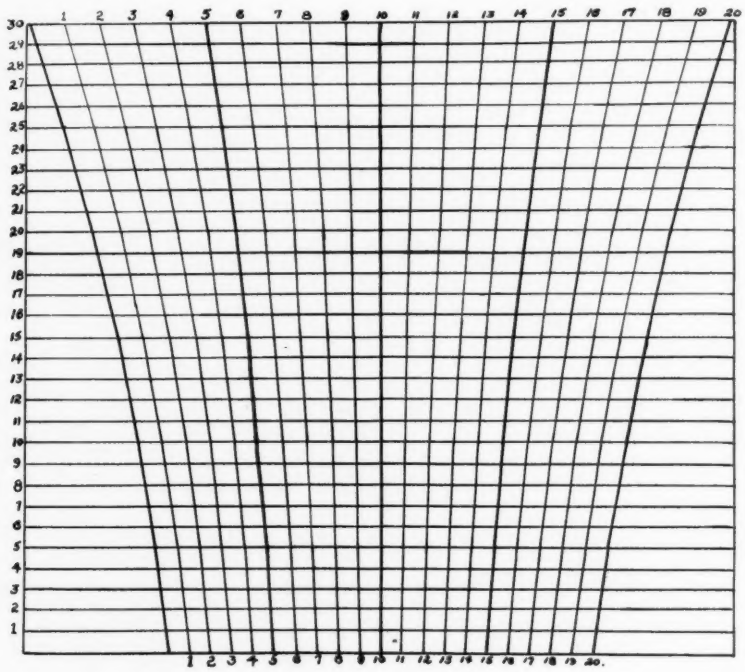

Fig. 1
False centimeter scale at centimeter heights. Tube-film distance thirty inches.

size of the fetal skull, the measurements of the pelvic inlet are relatively unimportant. It would be just as difficult or impossible to deliver a viable hydrocephalic child through a normal canal as it would be to deliver a normal child through a contracted pelvis.

The principle of the method is very simple.

By using a constant tube-film distance, any object placed at a known distance above the film will show the same degree of magnification on the roentgenogram as any other object at the same height. The chart that I have made shows the degree of distortion at centimeter heights above the film at a tube-film distance of 30 inches (*Fig. 1*).

For instance, if you know the height of the symphysis pubes or plane of the pelvic inlet above the film, by measuring its diameters on the film and checking these against the chart at the same height, you make a direct reading of the true or actual measurements of the inlet. You will observe how it works as we proceed with the picture.

DISCUSSION (*Abstract*)

Dr. Franklin B. Bogart, Chattanooga, Tenn.—I believe the radiologist will find the obstetrician rather hard to convince that there is an accurate x-ray aid in cases of this type, but once the obstetrician has seen the method demonstrated he will be a most enthusiastic supporter. Of course, it is not every obstetrical case that needs such an examination, but in the case where an obstetrician needs aid of this kind he needs it very badly. It will enable him to select the cases that need surgical interference and to administer the surgical aid at the time it ought to be given. On the other hand, in questionable cases it will enable the obstetrician to determine beforehand that the cases can go on to normal delivery.

Dr. R. T. Wilson, Temple, Tex.—Within the last two years I have heard a very prominent roentgenologist of Chicago make the statement that he would not allow his wife to have an x-ray examination for anything where the uterus was to be exposed to the rays if he suspected her to be pregnant, within the first few weeks. I should like to have Dr. Walton's opinion on that point.

Dr. Walton (*closing*).—We have all had the same experience in regard to the general attitude of the medical profession whenever roentgenology has entered a new field in medical diagnosis. The specialists are usually first skeptical, then tolerant, and later enthusiastic. It is merely a matter of education. Our obstetricians are quite enthusiastic and the roentgen examination is now routine in all questionable cases.

I did not touch upon the early diagnosis of pregnancy with the roentgen ray, but I believe we can now show the fetal skeleton in most instances between the twelfth and sixteenth weeks of pregnancy.

We make the x-ray measurements in the late stage, usually two weeks before delivery.

There is no danger whatever from the use of the roentgen ray for diagnostic purposes in any stage of pregnancy.

OBSERVATIONS ON BREAST MILK PRODUCTION DURING NEWLY-BORN PERIOD*

By ARTHUR G. QUINN, M.D.,
Memphis, Tenn.

The need of breast milk in a newly-born service is constant. Requests from the infant wards and from outside physicians for breast milk are frequent. This need and the requests were always taken care of in the usual way. The amount of breast milk obtained has always been inadequate. It was thought that if a routine method of breast pumping could be instituted, we should have a supply of breast milk on hand at all times. To accomplish this we decided to pump the breasts of all mothers at a regular feeding interval. In lieu of putting the infant to the breast we give a supplementary feeding.

In the selection of the time to pump, we had to consider the nursing staff and the attending staff. The regular routine of the hospital required the continuous service of the nurses in the morning, so the 2:00 p. m. feeding period was selected. The Abt electric pump is used for pumping. We found that when a nurse was not properly trained the amount of breast milk obtained was decreased at least 50 per cent and that it required twice the time to obtain it. One nurse was put in charge of breast pumping and it required from five to fifteen minutes for her to empty both breasts. On account of the number of mothers pumped, this time was impractical. With the use of a "Y" glass tube, two bells, and increasing the pressure, we found that we could empty both breasts almost as quickly as one. The following report was made each day:

DAILY MOTHER REPORT

Number of mothers with babies.....
Number of mothers with 4-plus Wassermann.....
Number of mothers without Wassermann report.....

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*Read in Section on Pediatrics, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

*From the Department of Pediatrics, University of Tennessee.

Number of mothers sick.....
Number of mothers under four-day post partum.....
Number of infants on complementary feedings.....
Number of white mothers pumped.....
Amount of milk obtained.....
Number of colored mothers pumped.....
Amount of milk obtained.....
Total number of ounces of milk obtained.....

These reports are the basis of the figures in *Table 1.*

The patients who come to the Maternity Ward of the General Hospital are approximately 60 per cent colored. The white patients are from the lower class of white people. With these classes of patients it is not surprising that we have four-plus Wassermann reports in 17 per cent. A large percentage of these positive reports were gotten when the patient first applied to the Out-Patient Department. They were given treatment with good results. We considered them positive and would not include them for pumping except where we had requests for milk for luetic infants. No milk obtained from syphilitic mothers is included in any report.

The number of cases with no Wassermann reports is surprisingly high, and is due in some instances to negligence on the part of the clerk in reporting on the record in the Out-Patient Department. In other cases, the patient came into the hospital in labor, and there was a delay in obtaining the blood and returning the report.

The number of sick mothers speaks well for the care given by the Maternity Division.

The number of infants on complementary feedings is not high.

With a daily average of three white and four colored mothers pumped, we obtained approximately one quart of breast milk daily. This was ample for our needs before we started the routine breast pumping.

The production of breast milk based on one pumping per day from white and colored mothers is practically the same.

We believe that in the newly-born period of lactation there is a minimum of external stimulation for production.

Macy et al., and Laurentius, have shown that the production of breast milk is dependent to a great extent upon the individual and the circumstances surrounding her. The studies of the above workers were with women throughout a lactation period, or with periods covering ten or more days. It has been shown that complete emptying of the breasts at each feeding will increase the production rapidly.

Certain observations made on breast milk production during the newly-born period were analyzed and are herein reported. These observations relate to the milk flow at the four-hourly feeding periods during the day, for the second five days following parturition only.

There are 101 mothers used in this study. All these mothers were well, with negative Wassermann reports. All infants of these mothers were well. The mothers' diet was regular hospital diet. They were kept in bed until the ninth day, when they were permitted in wheel chairs or to stand on their feet for short intervals. Fifty-five mothers, or 54 per cent of the total, are colored. Sixty-four are primiparae; 15 are duiparae, and 22 are multiparae.

The procedure used in obtaining this milk is the same as in the above report except that the breasts are pumped once daily, on consecutive days at consecutive periods. For example, today they are pumped at 2:00 p. m.; tomorrow at 6:00 p. m. They are pumped only once in twenty-four hours, except in cases where the pumping would be at 10:00 p. m. This would result in the next following pumping at 6:00 a. m. to avoid consecutive pumpings. The next

Table 1

THE DAILY AVERAGE OF AVAILABLE AND UNAVAILABLE MOTHERS FOR ROUTINE BREAST PUMPING FOR 159 CONSECUTIVE DAYS

Admissions	Total No. Mothers	4-plus Wass. Report	Sick Mothers	No Wass. Report	Comp. Feeding	Under 4 days	White Mothers	Amt. Milk Obtained c. c.	Colored Mothers	Amt. Milk Obtained c. c.	Total Milk Obtained c. c.
Daily average	25.3	4.4	1.4	3.1	1.6	6.3	3.1	401	4.8	609	1010
Per cent total mothers		17.4	5.5	12.2	7.1	25.0	12.2	129	19.0	127	129

day they are pumped at 2:00 a. m., the next at 10:00 a. m., and so on.

Chart 1 is the average production of all mothers. The five curves represent first, second, third, fourth and fifth pumpings.

These curves demonstrate that one complete emptying of the breasts a day does not increase the production of milk in five days. This is in accord with Dr. Abt's findings.

Chart 2 contains curves showing the comparative production of primiparous, duiparous and multiparous mothers.

In this series there are 22 multiparous mothers with 80 previous full-term pregnancies. Fifty of the infants resulting from these pregnancies were successfully breast fed six months or longer.

Of the duiparous mothers, 9 successfully nursed their first infants six months or longer.

The per cent of previous successful nursing is 60 in both series.

The highest production at all feeding periods is among the duiparous group.

The lowest production at all feeding periods is among the multiparous group.

The curves of all three groups follow a rather uniform fluctuation throughout the twenty-four hours.

Chart 3 is the production curve of white and colored mothers.

The fluctuation is identically the same in both races, varying only in degree.

The average of the two curves is fairly uniform. Its greatest variation in amount of production is one ounce. The high occurs at 6:00 p. m. and the low at 6:00 a. m.

From these curves it is shown that white and colored mothers produce approximately the same amount of milk in twenty-four hours if they are living under the same conditions.

Chart 4 gives the production curves of Macy et al., Gerstley and the average of our cases.

Chart 1

Milk production curves of 1st, 2nd, 3rd, 4th and 5th pumpings showing fluctuations at different feeding periods.

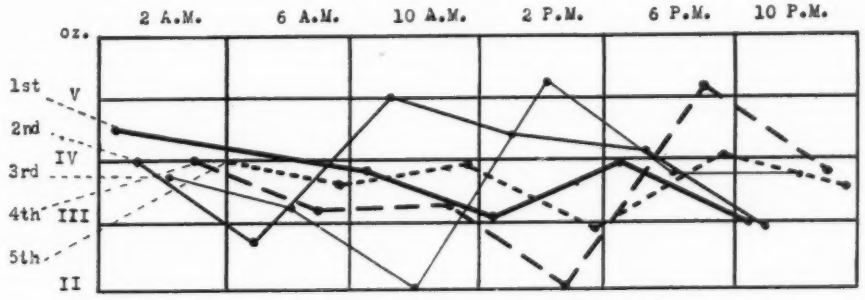


Chart 2

Showing fluctuations in milk production of para I, para II, and multipara mothers at different feeding periods.

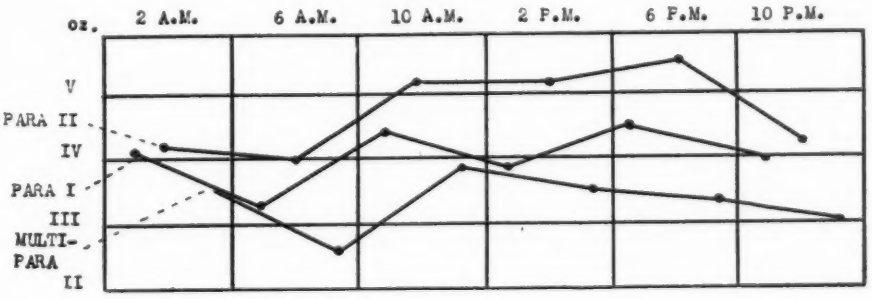
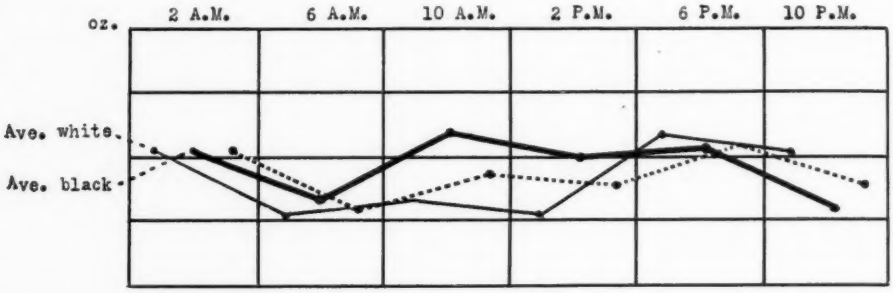


Chart 3

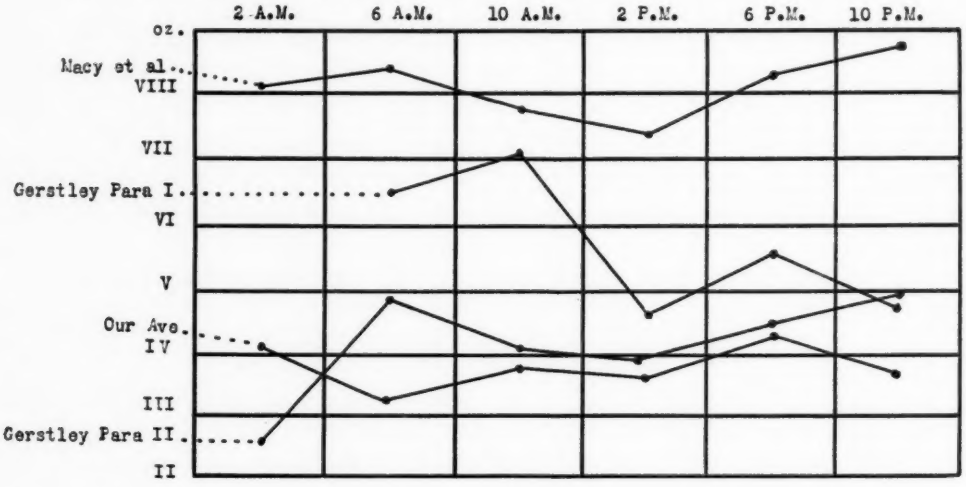
Fluctuations in milk production at different feeding periods of white and black mothers, with average for both.



Dotted line is average of the two.

Chart 4

Showing fluctuations in milk production curves at different feeding periods of different observers.



The production curve of Macy et al. is of two multiparae. The milk was expressed by hand at the various feeding periods with four-hour intervals over a period of ten days. Their work was done to show the increase of production from complete emptying of the breasts at each feeding time.

It was necessary to average their figures in three instances at the 2:00 a. m. period to obtain the curve covering all periods.

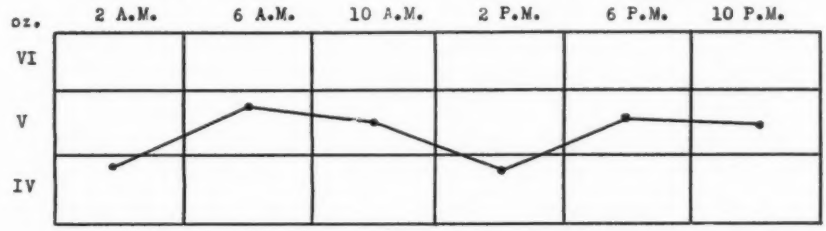
The two curves of Gerstley are of first and second infants of the same mother. They were weighed before and after nursing by the mother. Gerstley checked the figures of the mother on several occasions and found them correct.

The first infant weighed eight pounds. The second, six pounds. Both were healthy and appeared to be satisfied with the breast feeding. These cases were reported by Dr. Gerstley to show the amounts taken by different infants at different feeding periods, indicating that the appetite varied at different times of day.

Here we have an average production curve from two multiparae who manually expressed their milk for commercial purposes. This ac-

Chart 5

The average production curve of curves shown in charts number 1, 2, 3 and 4.



counts for the high production; and a curve which is the average of 101 mothers in the second five days after parturition.

These curves amply demonstrate what has often been shown, that demand influences production.

In studying these figures of milk production it was noted at the 2:00 p. m. period that the amounts were usually decreased.

Chart 5 is the average curve of the production during the newly-born period and of Macy et al., and the average of the two cases of Gerstley.

The figures given here are the average production of breast milk from mothers whose lactation was influenced by different factors. These factors are:

(1) Manual expression at each feeding period.

(2) Nursing infants.

(3) Factors within the mothers.

The definite increase in the amount of milk at the 6:00 a. m. and 6:00 p. m. periods, and the definite reduction in amounts at the 2:00 a. m. and 2:00 p. m. periods, suggests that there is a physiological factor that decreases and increases every twelve hours.

SUMMARY

Routine pumping of the breast at one feeding period during the day in a maternity hospital is practical. It provides a ready supply of breast milk for the hospital. With the cooperation of the attending physician it can be carried out in a private institution.

In the newly-born period, one complete emptying of the breasts in twenty-four hours does not increase the breast milk production in five days.

Multiparous mothers do not produce more milk than primiparous or duiparous mothers.

White and colored mothers produce approximately the same amount of milk in twenty-four hours.

The increase and decrease of production at the different feeding periods occur at the same time in white and colored mothers.

An average of all production figures shown here gives a decrease and an increase of production every twelve hours.

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DISCUSSION (*Abstract*)

Dr. L. R. DeBuys, New Orleans, La.—Dr. Quinn has made observations during that period of life when the breast is just beginning to come into its natural function, and in his observations he is using an artificial method in milk production. We are familiar with the situation in the cow when she lets down her milk; we have all heard of that. There is certainly a psychic influence in the mother when she nurses her baby, and it is very probable that usually the mother who nurses her baby will give more milk to her baby than she would otherwise give with the use of abnormal measures. The problem, nevertheless, does arise when it becomes necessary to secure milk in institutions for the newly-borns. We have had that problem in our service for years. It is interesting to see how the various mothers cooperate. The mothers in the free service are perfectly willing, if they have enough milk, or if assured that they have enough milk, for their own babies to give any additional milk that they might be able to produce for any other baby. It is also interesting to note that many private cases are just as willing to help the other babies. That seems to disprove the old bugaboo that we used to hear that mothers do not want

to nurse their babies, that there is a greater tendency for women to refrain or, rather, to be excused from nursing their babies. We have found that to be an exception in our experience.

Just whether Dr. Quinn is getting all that he can, or getting the maximum production, at that hour of the day, I am unable to say. But in those babies in our service who are not doing quite so well as we want them to do, we make observations under normal conditions, weighing the baby before and after nursing on the right breast in the morning and before and after nursing on the left breast in the morning, and before and after nursing on the right breast in the evening, and the same observations on the other breast in the evening. We have found decided differences in the amounts of milk given at the later feedings as compared with the morning feedings. We have also found differences on the two sides, one breast giving much more milk than the other.

Mothers of twins are capable of nursing two babies as readily as they can one. I remember visiting an institution once to which a woman could go for a confinement without any to do and pay for the confinement and leave the institution and leave the baby in the institution. Other women could go to that institution and receive the same attention, and in compensation or in appreciation for their obstetrical care they agreed to nurse another baby for a period of six weeks. These women are just as capable of nursing two as one. It is a question of supply and demand.

Dr. Eugene Rosamond, Memphis, Tenn.—In institutions, these mothers are cared for, they are fed, they are warm, they are not worrying over their babies and the physician is in constant attendance. The results disagree with what we find in clinical practice, that is, that the lowest period of milk production occurs at 2:00 o'clock in the afternoon. We all know that breast-fed babies cry from hunger late in the afternoon or at night, just about the time the poor, worn-out mother wants to go to bed. That, certainly in clinical practice, is the time of lowest milk production.

So-called "three months colic" is hunger. It occurs at a particular time each day, and that time corresponds with the time of the mother's greatest worry and exhaustion and is always in the late afternoon and at bed time.

Dr. Quinn (closing).—As Dr. DeBuys states, the need of breast milk for the premature and sick infant is urgent and that is the primary object of our milk pumping. The necessity of more milk in our service is present only occasionally. When it does arise we pump at more feedings.

All mothers are glad to cooperate in this work.

Dr. Rosamond states from the standpoint of the infant the lowest production period is at 6:00 p. m. According to the average figures, the least amount is at 2:00 p. m. No doubt many do have low production at 6:00 p. m.

INCIDENCE OF DERMATOPHYTOSIS OF THE FEET WITH COMMENT ON THE USE OF TRICHOPHYTIN*

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and
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Introduction.—Our observations were made on 810 individuals who were "casuals:" 407 were private cases; 173 were women in a hospital training school, residing in two buildings; and the remainder, 230, in a hospital out-patient department. A more ideal selection would have been one including, for example, those individuals entering an out-patient department for various ailments (including diseases of the skin).[1] Nevertheless it gives a fair cross section of individuals who did not complain primarily of foot ailments, but did include them. A routine examination of the feet (including occasionally hands, axillae, groins and perianal and perineal areas) was made in all cases. Microscopic examination of skin scrapings was made in every case, and cultures and trichophytin tests were made in a selected number, respectively.

No attempt has been made to cite the enormous literature on these aspects. Reference is made, however, wherever pertinent, from time to time, which will give ample information to any student of dermatophytosis of what has been published on the subject both in this country and abroad.

Obviously we are stating no new facts; we have merely endeavored to obtain some statistical information regarding the incidence of dermatophytosis and regarding certain phases of its pathogenesis, especially with reference to the more recent concepts of the use of trichophytin. It is, of course, not extravagant to hope that by a better understanding of the complications of dermatophytosis, a better rationale for treatment may be evolved. Certainly the complications (phytids), the recurrence of the disease (reinfection), and the admitted resistance to treatment make pursuit of any efforts in these directions worth while. Ringworm cannot always be cured by local measures. What the

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significance of immunity, acquired or induced, means has not as yet been evaluated.

Clinical Disease.—A consideration of this leaves us without any criteria or standard. Consequently we have concluded for this study that in view of symptomatic dermatophytosis (finding fungi by microscopic methods) it is advisable to consider all cases presenting moisture, (with and without hyperidrosis), maceration, scaling, fissuring, and with and without inflammatory changes, as being clinical cases or at least partially affected. Inasmuch as the common clinical picture of dermatophytosis, such as discrete vesiculation, erythema, with scaling, crusting and bordered patches, is most often a condition provoked by trauma (such as shoes or pressure and by medication, including vigorous washing), it is advisable to speak of this as a complicated dermatophytosis. The same criterion may be applied to the picture of eczema or dermatitis as usually presented to the observer: one rarely sees the original lesions on account of the extraneous factors mentioned above.

Cultures.—We approach any comment upon cultures with many reservations. Nevertheless certain facts are pertinent. On account of careless or of incomplete collection of material and because only one tube (and not 6 or 12 tubes) of culture medium is planted, it is readily conceivable that a growth of fungi may be infrequently procured. (This includes also the possibility of using poor media.) Naturally the enormity of the number of examinations might preclude a faultless technic. Certainly this aspect of obtaining positive findings (growth) bears out the criticism when one reviews the findings of the various authors. Of course, it is a great satisfaction and assurance to confirm clinical and microscopic results with positive cultural plants.

Technic.—It is a well-known fact in the experience of many observers that proper technic is a *sine qua non* in obtaining positive microscopic findings in a majority of cases of clinical disease. The method of scraping deeply is to be commended, inasmuch as the organisms are conceded to be well embedded in the rete layer, and not infrequently antiseptic applications remove the organisms from flaky and superficial scales. This does not apply to the tops of vesicles or scrapings through vesicles. Furthermore, the application on the part of the patient of greasy or oily substances or the use of soap and of powder introduces foreign elements which may be responsible for the presence of the so-called artefacts, or otherwise create a poor specimen.[2]

We have found it advantageous to remove extraneous material as far as it may be possible by preliminary washing with ether (which may not invalidate culturing), and then applying for moisture a small quantity of normal saline, glycerine or even potassium hydrate solution (for smears only) before scraping. This idea was suggested many years ago by consulting a chart (Ham's) of dermatoses common to various anatomic areas. Thus one obtains a pulp by scraping with a surgical blade, and this material is readily handled for both smears and cultures. It avoids spilling desired material, especially if dry.

Mosaic Fungus.—The pathogenicity of this fungus has been repudiated by most observers, yet one cannot escape the implication that it may be of importance. Being found frequently in normal conditions with merely scaling and superficial fissuring of the upper layers of the skin, with hyperidrosis and without crusting, its pathogenicity would tend to have support. Further, it may be found together with mycelial elements without clinical disease and, conversely, both types may be found with clinical disease. It may disappear in specimens kept for 24 hours in a moist chamber.

In the light of occasional positive trichophytin tests with clinical disease, and also without clinical disease, where mosaic fungus alone has been demonstrated, one naturally wonders how to evaluate such findings. It would seem to be a challenge for the authenticity of the tricophytin test, if mosaic fungus is not considered a true pathogenic organism.[3]

Yeasts.—Evidence is surely accumulating to indicate that so-called yeasts, frequently saprophytic on the skin, may be the pathogens which evoke clinical dermatophytosis in various anatomic locations; and this apparently holds for disease on the feet. Certainly the occurrence in rich quantities in the presence of clinical disease makes such pathogenicity plausible.[4]

The microscopic evaluation of yeasts and of yeast-like bodies has not, to our knowledge, become standardized. Artefacts such as "bottle," "pessary," budding and other forms throw some suspicion on their authenticity. Weidman (personal communication) considers these forms to be possibly lipoids. Perhaps the use of soaps and ointments is responsible for their origin. Confusion with spores, the presence of irregular short mycelial-like elements and the tendency to morphologic change on artificial media merely tend to complicate the problem.[5]

Evidently the ability to obtain cultures readily of these organisms or bodies would be proof

positive of their specificity, and successful inoculation tests on humans should convincingly prove their pathogenicity. But a satisfactory fulfillment of Koch's postulates has not been generally acknowledged.

Weidman, in a personal communication, states that in his opinion

> "Yeasts are at the basis of some cases of dermatophytosis, but probably in a lesser proportion of cases than the hyphomycetes;" he does "not believe that enough work has been done in the precise determinative direction to state whether they occur as saprophytes occasionally becoming pathogens later on."

In this connection, then, the trichophytin test has been of suggestive help. As a corollary to this, it naturally is suggested that the use of vaccines or of antigens made from such cultures of yeasts as may be procured from humans would be of immense interest and value by way of comparison with the results of trichophytin injections. Attention is directed to our results where trichophytin tests were positive with clinical disease, with negative cultures, and yeasts only were demonstrated microscopically. Thus the trichophytin test may be a partially specific test which may become valuable in determining the fungus nature of dermatoses which are clinically ringworm and in which yeasts alone are found (if not always cultured).

TRICHOPHYTIN*

Is the reaction non-specific or pseudo-specific? We infer that the various cultures from which it is made have the same botanical place as do those fungi which are most often concerned with the production of dermatophytosis.

This naturally raises the query of what relationship there may be between the trichophytin antigens and the yeasts from a botanical standpoint. The question has probably been discussed, but we are not acquainted with any literature on the subject.

Another aspect of the test is the frequency of a strongly positive reaction in extensive disease. Perhaps the same criteria of dosage might be applied here as have been raised in the case of tuberculin inoculations. This point was stressed by Michael recently in discussion, and in our opinion with much importance in the evaluation of the reading. Consequently, we have made a number of tests with the higher dilutions, but an insufficient number does not permit of any deduction or conclusion at this time. However, we are impressed with the importance of using these dilutions.

Still another aspect of criteria of the test arises over the presence of the phenol contained as preservative. We have noticed a large number of reactions in the control (intradermally injected) area, but never a reaction with erythema and papulation unless a pronounced reaction also occurred in the other areas injected with trichophytin.

It would be of some interest to record the nature of both local and focal reaction with intradermic injections of trichophytin. Unfortunately, we did not make a careful examination of this aspect of the tests, but it is hoped that some one will in the future give a detailed account of this, with special reference to the clinical course.[6] Van Dyck[7] and his collaborators did not emphasize this aspect in their diagnostic and therapeutic report.

Specificity of Trichophytin.—Van Dyck and his co-workers obtained positive tests in all cases (100) of tinea located on hand, foot, groin and other areas. No other diseases, except pityriasis rosea, were recorded; and it was assumed that in their note of positive findings in the latter disease the patient did not have clinical dermatophytosis. As controls, they listed 30 cases of various dermatoses involving many parts of the body, all of which gave negative tests.

Table 1

Number of specimens examined 810
(a) Clinical disease ..... 363, or 44.8%
(b) Non-clinical disease ..... 447, or 55.2%

EXAMINATIONS FOR FUNGI 810

Findings	Specimens		Clinically Positive Cases		Clinically Negative Cases	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Mosaic fungus	174	21.5	69	19.1	105	23.5
Mycelium	156	19.2	116	31.9	40	8.9
Yeasts	142	17.6	90	24.9	52	11.7
Spores	19	2.3	17	4.6	2	0.5
Total positive findings	491	60.6	292	80.5	199	44.6
Artefacts	10	1.2	5	1.3	5	1.1
Negative findings	309	38.2	66	18.2	243	54.3

*The trichophytin we employed was the product of the H. A. Metz Laboratories, Inc., New York City. The description of the product is available through their brochure. Three areas were inoculated on the flexor side of the forearm by intradermic wheal formation of 1/20 c. c. of trichophytin. Dilutions of 1:50 and 1:30 were used at first, later decreased to 1:100 and 1:50. The diluent was normal salt solution with 0.25 per cent phenol added, and this, of course, was the control always injected at the time of the two tests.

We employed the same product as did Van Dyck and his co-workers; thus any results, as suggested by Sulzberger (personal communication) will at least have some assured aspect of uniformity.

The biologic significance of trichophytin in the light of analogy to that of tuberculin would seem to rest on invasion of the host by pathogenic fungi.[7] Since the original observations applied to deep-seated ringworm, one must ponder on the large number of positive reactions in the presence of superficial fungous disease.

Naturally the integrity of the preparation trichophytin would, in this connection, demand closer scrutiny. As a diagnostic agent, its work is suggestively sound, but not completely so, as shown by our results, thus lacking a great desideratum. However, it may become of great assistance in the differentiation of irritation dermatitis and of fungous dermatitis. If it is to be taken as a diagnostic help, one must assume that fungi, with or without dermal changes, have actually entered the blood stream.

One cannot escape the analogy of the entire dermatophytosis problem to that of cutaneous tuberculosis and of tuberculides. It may not be presumptuous to recall attention to the fact that experimental evidence has given a working idea of the mechanism of the production of the tuberculides. The contributions of Helmholz[8] and of Rist and Rolland[9] are the basis for this reasoning. It has been shown that tubercle bacilli introduced into the skin of an animal previously inoculated with tuberculosis (and thus giving a positive tuberculin test) are rapidly destroyed (within hours to a few days) at the site of inoculation or, if introduced into the blood stream, they are likewise destroyed. The explanation apparently rests on the fact that antibodies or lysins are responsible for this phenomenon. Naturally, such inoculations, whether into the blood stream or into the skin of a normal, non-infected animal, may set up disease, tuberculosis.

Furthermore, the histological changes in the skin of an infected (sensitized) animal, later receiving an injection of bacilli into the skin, do not give the picture typical of tuberculosis (this is substantiated by the histologic changes in tuberculides). The primary injection of tubercle bacilli into the skin of a normal animal (not previously sensitized) is, on the other hand, likely to give a typical tuberculous structure.

Thus it would seem suggestive that a similar situation arises in the case of dermatophytids. The experimental work of Peck[10] certainly tends to confirm this, albeit the conditions of inoculation in his patient were not exactly those which obtained in experimental tuberculides. However, in both instances of tuberculosis and of dermatophytosis it may be reasoned that the individual being sensitized on account of his infection develops a condition in which there occurs an invasion by the tubercle bacilli or by fungi (or of their products) into the blood stream. This permits positive tests to be obtained with both tuberculin (in tuberculosis) and trichophytin (in dermatophytosis). These facts are borne out in practice; the individual infected apparently does not require the presence of tuberculide or of dermatophytid in order to respond to antigens, tuberculin or trichophytin.

The presence of the "ids" is perhaps partially

Table 2

CULTURES MADE 692

Findings	Clinically Positive Cases		Clinically Negative Cases		Totals Of All Cases		Clinically Positive Cases 270		Clinically Negative Cases 422	
	No.	%	No.	%	No.	%	No.	%	No.	%
Fungus growth	63	9.1	36	5.2	99	14.3	63	23.3	36	8.5
No fungus growth	207	30.7	386	55.0	593	85.6	207	76.7	386	91.5

Cultures 692
Growths ..... 99, or 14.3%
No growths ..... 593, or 85.7%

Clinically positive cases 270
Clinically negative cases 422

Table 3

TRICHOPHYTIN TESTS 230

Trichophytin Positive 112 Cases, or 48.6 per cent				Trichophytin Negative 118 Cases, or 51.4 per cent			
Clinically Positive 65 Cases		Clinically Negative 165 Cases		Clinically Positive 65 Cases		Clinically Negative 165 Cases	
No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
54	83.1	58	35.2	11	16.9	107	64.5

Table 3 (continued)

	Trichophytin Positive				Trichophytin Negative			
	Clinically Positive Cases		Clinically Negative Cases		Clinically Positive Cases		Clinically Negative Cases	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Mosaic fungus	7	10.8	28	16.9	6	9.3	14	8.5
Mycelium	33	50.8	5	3.0	3	4.6	5	3.0
Yeasts	13	20.0	6	3.6	1	1.5	14	8.5
Total of above	53	81.6	39	23.5	10	15.4	33	20.0
Negative findings	1	1.5	19	11.6	1	1.5	74	44.9
•	54		58		11		107	

explained as outlined above, and the individual exhibiting them should give a positive reaction to his specific antigen, thus completing the conception of the original infection (tuberculosis of viscera, joints, glands, skin) or of dermatophytosis (deep or superficial of the skin).

Lewandowsky[11] leaves the question with the following statement:

"The protean aspect of cutaneous tuberculosis is readily explained from the different variation of these three factors: the individual disposition, the number of the bacilli, and the immunity reaction of the organism."

COMMENT

Fungi were found in 491 cases, 60.6 per cent of all cases. Two hundred and ninety-two cases (59.9 per cent) were clinically positive, 36 per cent with fungi; 199 (40.1 per cent) were clinically negative, 24.6 per cent with fungi.

The trichophytin test was positive in 54 clinically diseased cases (53 with fungi). This was 83.1 per cent of all 65 cases (clinically diseased) and 48.2 per cent of the entire group giving a positive test.

The test was also positive in 58 not clinically diseased cases (39 with fungi). This was 35.2 per cent of all 165 (not diseased) and 52.8 per cent of the entire group giving a positive test. This appears unusual.

It was negative in 11 clinically diseased cases (10 with fungi). This was 16.9 per cent of all 65 clinically diseased cases and 9.2 per cent of the entire group giving a negative test.

Again, it was negative in 107 not clinically diseased (72 revealing fungi). This was 64.8 per cent of 165 (not diseased) cases and 90.6 per cent of entire group giving a negative test.

The figures 83.1 per cent compare with the findings of Van Dyck and others who obtained a positive test in 100 per cent of all clinically positive cases.

The clinically negative cases with positive trichophytin test may possibly be explained on the ground that 67.2 per cent of these revealed fungi.

Thus the specificity of trichophytin has not been proven to our entire satisfaction. For instance, we obtained a positive test in 19 cases (32.7 per cent of all positive tests), revealing no disease and no demonstrable fungi. Van Dyck and his co-workers obtained no positives in 30 cases not clinically dermatophytosis.

A positive test in the presence of fungi (39 cases of various types) without clinical disease also supports this view of pseudospecificity. However, if clinical disease may have been overlooked, one may assume that fungi have entered the blood stream to evoke hypersensitivity without producing phytids. Furthermore, it may be possible that other conditions of a biologic nature not demonstrable in tested individuals may account for the positive test.

Again, a negative test in the presence of clinical disease with demonstrable fungi (10 cases) and a weak positive test in the presence of both clinical disease and demonstrable fungi (3 cases) are somewhat puzzling.[12]

Here the pitfalls of technic and other undetermined conditions may account for the apparent discrepancy. Perhaps a state of anergy existed (Jadassohn's[13] explanation of a negative tuberculin test in cutaneous tuberculosis) or perhaps hypersensitivity had not yet become established to permit of positive reaction.[14]

Therefore, until these conditions of apparent incongruity of reaction are clarified, we are constrained to accept specificity of the trichophytin test with reserve. It is of genuine value as a diagnostic agent of potential dermatophytosis in the presence of fungi; and it thus may become a pronounced help in desensitization as a therapeutic procedure.

Before this aspect can be settled it will be necessary to determine the degree and stability, if any, of an established immunity. The tendency in some cases to relapse after trichophytin therapy is, in our experience, an actuality, but

our cases are too few at this time to permit of definite conclusions.

SUMMARY

The results of examination of 810 patients with regard to the incidence of dermatophytosis of the feet are recorded. The percentage of all clinical disease is 44.8, much in accord with the findings of other reporters. Likewise the routine taking of cultures in 692 cases, although not ideal from the standpoint of technic, gave a small number of growths (14.3 per cent), an unsatisfactory finding.

A discussion of the significance of yeasts and of the so-called mosaic fungus is briefly added.

The use of trichophytin in 230 cases as a test procedure has yielded some interesting figures, especially with regard to positive reactions in cases revealing clinical disease and cases without clinical disease. These are discussed with help of tables with reference to the presence of fungi demonstrated by microscopic examination.

A comparison of the test with that of tuberculin in tuberculosis is given in order to explain its status both as a diagnostic and possibly therapeutic agent.

CONCLUSIONS

Dermatophytosis of the feet is apparently an epidemic disease in the Eastern section of this country.

Microscopic examination of the affected skin revealed a large percentage of fungi, including the so-called mosaic fungus.

The pathogenicity of these forms still remains to be satisfactorily established and standardized.

Trichophytin tests gave some valuable data, especially from the standpoint of sensitivity and also by way of confirming clinical diagnosis. The importance of desensitization by this agent as a therapeutic measure must be left for the immediate future to record.

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DISCUSSION (*Abstract*)

Dr. Jeffrey C. Michael, Houston, Tex.—I wish to confine my remarks to the diagnostic use of trichophytin in dermatophytosis and dermatophytids. First, it should be recalled that trichophytin is group but not species specific. Trichophytin is probably an endotoxin common to this group of organisms. Yeast infection does not produce allergy to trichophytin.

In Bloch's Clinic, trichophytin is made from an achorion; my own experience has been confined to trichophytin "Hoescht." The extensive work done in Europe with trichophytin seems to have demonstrated its reliability. In this country so many people react to it that its diagnostic value is militated against. Positive reactions in individuals free from any evidence of the disease means, in my opinion, that they formerly suffered from a fungus infection. The reliability of the trichophytin test should not be questioned because the patient happens to be free of clinical manifestations at the time a positive test was obtained. The most important information for diagnostic purposes is obtained from a negative test. Thus a negative test rules out an "id" eruption even though all other requirements for such a diagnosis are present. But a positive test does not mean that the suspected "id" eruption is necessarily an "id." In this respect, the test is subject to the same interpretation as the tuberculin or Wassermann tests.

Trichophytin allergy lasts a long time; one year, at least, in my own experience after all clinical and laboratory evidence of the disease has disappeared. Sulzberger told me that everything pointed to its lasting throughout life. A fungus infection may be entirely asymptomatic and yet allergy will be produced. It is for these reasons that the essayists' 10 cases of positive trichophytin tests without history of infection are not entirely satisfactory evidence when the reliability of the test is in question. Infants would be better test subjects.

Dr. Harry M. Robinson, Baltimore, Md.—A negative trichophytin test means no more than a negative Wassermann reaction or tuberculin test. Dr. Pels and I know of a few cases of active skin tuberculosis in which the tuberculin reaction has been negative. Certainly in some active cases the trichophytin test has

been negative in my hands. A negative trichophytin test means no more than a negative patch or intradermal test and they mean very little.

Dr. N. F. Thiberge, New Orleans, La.—I should like to ask the essayists how the test was applied. Some of the methods of applying allergic tests are absolutely misleading; allergists rely upon the result of the test only when they are made intradermally.

Dr. Pels (closing).—The intradermal route was employed and patch and scratch tests were not made because Peck has recently published an article stating that the most reliable test of all is the intradermal.

All tests were done on adults, and they were selected because a large number had clinical disease as well as demonstrable fungi. We purposely omitted children, but took the other individuals as they came. Nor did we list the age, sex and so on, for we felt that these did not play a particularly important part in the work we wished to do.

Unfortunately, we did not record the number of what we considered phytids in connection with the reading of the test. That could probably be done by looking up the records of the various individuals who were tested. A history of ringworm disease in individuals giving a positive test without the presence of clinical disease, or without the presence of fungi, may be misleading. The patient may merely have thought he had ringworm.

Dr. Robinson asked about the negative tests, particularly in individuals having positive clinical disease with or without fungi. The explanation is not easy, any more than, as he has admitted, a negative tuberculin test or a negative Wassermann test is easy to explain in the presence of clinical disease. Certainly we must take into consideration the person doing the test. Some persons will not accept an individual Wassermann test and demand two or three; and we must also consider here the condition of anergy when one does not obtain a positive reading.

FUNGUS INFECTION OF BONE AND JOINT*

By P. M. KEATING, M.D.,
San Antonio, Tex.

The fungi constitute that group in plant life whose members do not have stems, roots or leaves, nor do they contain chlorophyl. They are larger than the bacteria, reproduce by spores and have a cell membrane. They form specific antibodies in infected subjects, which may be demonstrated by precipitation, agglutination and opsonic phenomena.[1] They in common with the tubercle bacillus alone contain an element of fat in their structure, and in the scale of life may be placed just below the protozoa of which the spirochete is the lowest form, and above the bacteria of which the tubercle bacillus is the highest form.

The fungi may be divided into three main classes:

The Ascomycetes, ascus or spore containing sac, yeasts.

The Hyphomycetes, reproduce by conidia or asexual spores (monilia).

The Trichomycetes, direct branching or fission (actinomyces).

The subject matter of this paper deals with infection of bone and joint by certain of the hyphomycetes or fungi imperfecti and of the sub class, monilia. The basis is the study of 25 patients who have come under my observation during the past four years.

Six positive cultures from biopsy material, certain other cultural, clinical and radiological data, together with the results of a small number of animal inoculations, constitute the evidence which I present to you that fungi may be the infecting agent in these cases.

It may be well first to review briefly the rather voluminous literature of fungus infection, because there seems to be little realization of the frequency of this condition, or of the clinical differences between infection by fungi and by bacteria.

Blastomycotic infection I believe was first reported by Gilchrist[2] in 1886, and since that time over 250 articles classifying and describing these organisms and reporting cases of known infection of soft tissue, bone and joint have appeared in the literature.

Ashford[3] believes that tropical sprue is due to monilia infection and Ashford and Wachowiak[4] have cultured monilia from the blood stream in cases of sprue.

In 1910, Caraven,[5] in a masterly article, reviewed the literature to date and mentions 16 proven cases of bone and joint infection by saccharomyces or oidia, and over 20 cases of sporotrichositic and hemisporotrichositic infection.

In the more recent literature, cases of generalized as well as localized infection, at times involving bone and joint have been reported by Stokes, Keiser, and smith,[6] by De Potter,[7] Kilkes, Wachowiak and Flesher,[8] Stovall and Greely,[9] and by Castellani[10] and others.

In 1924, Jacono[11] cultured a monilia from an infected tibia and in 1928 Connor,[12] and the author,[13] and in 1930 Jones[14] all reported cases of moniliasis of bone or joint.

It is readily seen, therefore, that fungus infection is not a new nor even a very rare condition; but the possibility of its presence is seldom considered in the diagnosis of a case of bone disease. As the treatment of this condition and even the prognosis differ from those given in bacterial infections, a more general recognition and study of this subject would seem to be advisable.

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twenty-Fifth Annual Meeting, New Orleans, Louisiana, November 18-20, 1931.

Many of my cases came to me after protracted treatment with diagnoses made by x-ray alone of syphilis or tuberculosis, the two infecting agents most closely related to the fungi in the scale of life.

Fungi are chronic in their action upon bone and cause localized areas of absorption, increase in density of the surrounding cortex and irregular hypertrophy of the periosteum. They form tubercles which contain giant cells surrounded by round cell infiltrate. Abscess formation may occur. The involvement frequently is widespread and occurs in more than one bone, but intervening joint cartilage seems to remain at least partially intact. The iodides are of distinct benefit in the treatment of fungus infection, while they are harmful in tuberculosis and have no effect upon pyogenic bacteria. It is true of course that the iodides are of great value in the treatment of lues; but in the cases here reported this infection has been ruled out as carefully as possible.

The clinical manifestations in these patients varied so greatly that it seemed wise to classify them for working diagnosis under the following heads:

	Cases	Biopsies
(1) Recurrent osteomyelitis	2	2
(2) Chronic arthritis atrophic	8	1
(3) Infectious arthritis of hips	5	3
(4) Osteitis of vertebral bodies sacrum and ilium	2	0
(5) Osteochondritis	6	0
(6) Paget's disease	2	0

GROUP I—RECURRENT OSTEOMYELITIS

Recurrent attacks of acute osteomyelitis of the long bones may be due to numerous types of infection, and frequently are caused by staphylococci or streptococci. This is primarily a disease of childhood, starting usually as a blood stream infection, involving an epiphyseal area and from thence spreading to the shaft of the bone and often to joint structures as well. Save for the syphilitic variety, however, it is usually a disease which becomes quiescent in adult life unless some old focus in an infected bone again becomes active.

Certain special features differentiate the type of case to which I refer, namely: recurrent attacks of acute osteomyelitis occurring over a period of many years in the shafts of the long bones. The heads of the femora in one case showed flattening and deformity, the right femur typical and the left not atypical of some previous process resembling osteochondritis. Motion was restricted and the joint space was slightly narrowed. There was marked thickening and at times bowing of the bones, with cavitation or small irregular cyst-like areas scattered throughout. The cortex was thick, and the periosteum was greatly and irregularly hypertrophied.

On section these bones were almost of the consistency of marble. The periosteum was thickened and sclerosed. No definite medullary cavity could be found; but a series of apparently unconnected small cyst-like areas containing granulation tissue and at times purulent material were seen. Decalcified specimens showed round cell infiltrate, occasional giant cells and numerous small hyaline-like bodies resembling monilia. These bodies, however, have not been proven to be monilia. Cultures from a humerus in one case and from a tibia in another showed a monilia similar to those found both in feces and sputum in their respective cases. Agglutination reactions and intradermal tests were positive and the opsonic rate was very high. Numerous leucocytes were seen with as many as eight engulfed monilia per cell.

Six months ago one of these patients had an acute attack involving the left great trochanter which required operation. The bone in contradistinction to that found in humerus and fibula, was soft, bled freely and showed both grossly and microscopically the usual picture of an acute pyogenic infection. An abscess cavity was evacuated and from cultures of this pus a *Streptococcus viridans* was grown. The wound healed completely in two weeks and the patient has had no further symptoms.

GROUP II—CHRONIC POLYARTHRITIS

Chronic arthritis of the atrophic type is believed by many men, including the author, to be due to streptococcic infection probably superimposed upon a definite endocrine imbalance. The fungus cases seem to differ in that there is more marked destruction and cystic degeneration of the heads of the bones, and far less pain and joint inflammation during the early course of the disease. There is very marked joint deformity, but save in the carpal and tarsal areas little tendency toward ankylosis. In one case we cultured a monilia from knee joint fluid, and in this knee there was definite hypermotility with recurrent subluxation.

There were eight patients of this type and they have all shown a heavy growth of monilia in the intestinal tract and throat, have had positive blood agglutination and intradermal tests to

ABSTRACT OF CLINICAL DATA

Case No.	Involvement and Type	Symptoms	Roentgenological	Throat and Tongue	Cultures Stool	Bone and Joint	Blood Agglutination	Opsonic	Treatment	Result
1 C.D.D. A., 39	Left elbow. Right humerus, hips, shoulders. Left fibula. Duration 27 years. Many acute attacks with drainage of bones	Mild pain, cough, loss of weight. During attacks has severe pain, swelling, temperature elevation and tenderness. No sinuses	Flattened and deformed heads of femora. Thickening of cortex and periosteum. Cystic degeneration	Monilia	Monilia	Monilia from humerus	Strongly plus 1-64	Very high rate	K. I. and vaccine	Great improvement clinically and radiologically
2 F.R. A., 42	Right tibia and fibula. Duration 20 years	Many acute attacks. Severe pain all the time. Right leg thickened and tender. Many scars. No sinuses. Afebrile	Very thick and dense tibia. Irregular in shape, sabre bowing. Periosteum greatly and irregularly thickened. Cystic degeneration. Fibula shows density and periostial thickening	Monilia	Monilia	Monilia from tibia	Strongly positive	Very high rate	K. I. and vaccine	Greatly improved
3 V. A., 18	Right hip, fifth lumbar vertebra. Duration 6 months	Gradual increase of pain and stiffness in hip for the past 6 months. No sinuses. Afebrile	Irregularity and flattening of head of femur. Cystic degeneration and areas of absorption of head and neck of femur. Increased density of acetabular ridge	Monilia	Monilia	Monilia from section of head of right femur	Strongly positive	Moderately high rate	K. I.	Improving
4 P. A., 19	Both hips. Left hip ankylosed. Right shows much impairment of motion. Duration 2 years	Two years ago onset with rise in temperature. Sinuses appeared three months ago. Febrile sinuses	Absorption of part of head of right femur and acetabulum with slight cystic degeneration and deformity of head. Increased density and thickening of acetabular ridge	Monilia	Monilia	Monilia from section of head of right femur	Strongly positive	High rate	K. I.	Greatly improved
5 S.L.B. A., 62	Knees, wrists, hands, feet, shoulders, lungs. Duration 16 years	Loss of weight and strength. Stiffness and pain	Cystic degeneration. Thickening and deformity of head of humerus and head of femur. Massive carpal degeneration. Erosion of radius. Subluxation of knee with atrophic arthritis. Fingers deformed, but held only by soft tissue contractures	Monilia	Monilia	Monilia from knee joint fluid	Strongly positive	Not done	K. I.	Improvement
6 P. A., 49	Shoulders, elbows, wrists, hands, knees and feet. Duration 20 years	Loss of weight, stiffness, pain, ankylosis of some joints and particularly of wrists and elbows	Cystic degeneration and thickening of humeri massive carpal, degeneration. Erosion of radii. Fingers deformed, but save for two joints held only by soft tissue contractions	Monilia plus	Monilia plus	No culture	Not done	Not done	Iodides	Slightly improved
7 J.A.G. A., 22	S. I. joints. Hips and spine. Duration, six years	Pain, tenderness and rigidity of lumbar spine. Loss of weight. Muscle atrophy below the waist. Cough. Foul stools	Cystic degeneration and erosion of both sacro-iliac joints. Cystic degeneration of heads of femora and acetabula areas. Cystic degeneration of bodies of fourth and fifth lumbar vertebra	Monilia plus	Monilia plus	No culture	Strongly positive	Very high rate	Iodides Vaccine	Improving

vertebra

ABSTRACT OF CLINICAL DATA (Continued)

Case No.	Involvement and Type	Symptoms	Roentgenological	Throat and Tongue	Cultures Stool	Bone and Joint	Blood Agglutination	Opsonic	Treatment	Result
8 E.J. A., 23	S. I. joints, hips and spine. Duration four years	Pain, tenderness and rigidity of lumbar spine. Loss of weight. Muscle atrophy below the waist. Cough. Foul stools	Cystic degeneration and erosion of both sacroiliac joints. Cystic degeneration of heads of femora and acetabula areas. Cystic degeneration of bodies of fourth and fifth lumbar vertebra	Monilia plus	Monilia plus	No culture	Not done	Not done	Iodides	Improving
9 A.C.S. A., 37	Sacroiliac region and hips. Duration three years	Pain in lower spine, hips and down thighs. Loss of weight. Headache	Thickened cortex and periosteum of pelvic bones with irregular cyst-like areas scattered throughout	Monilia plus	Monilia plus	No culture	Strongly positive	Very high rate	Iodides Vaccine	Greatly improved
10 P. A., 42	Pelvic region and right hip. Duration four years	Pain in lower spine and right hip. Impairment of motion of right hip	Decalcification of upper part of femur and right pelvic bones	Monilia plus	Monilia plus	No culture	Not done	Not done	Iodides	Very great improvement
11 W.S. A., 12	Left hip. Duration 6 months	Slight pain and limp	Fragmentation of head of femur with flattening and areas of decalcification. Typical osteochondritis	Not done	Monilia plus	No culture	Not done	Not done	Iodides. Rest. Thomas hip abduction brace	Usual good result
12 W.S. A., 14	Dorsal spine. Duration one year	Stoop. Fatigues easily. Slight pain in back	Decalcification of bodies of the lower sixth dorsal vertebra with some tendency to flattening, especially of anterior aspect. Typical osteochondritis	Not done	Monilia plus	No culture	Not done	Not done	Hyperextension of spine	Good result
13 D.G. A., 16	Both hips. Duration 1 year	Fatigue. Increasing difficulty on walking normally	Typical osteochondritis of both hips	Not cultured	Monilia plus	Not done	Not done	Not done	K. I. and restraint of motion by strapping	Very much improved
14 B. F. A., 28	Right knee. Duration 6 months	Pain on motion, slight swelling, moderate hydrops right knee	Erosion of inner side of condyle of right femur. Floaty patella	Not cultured	Monilia plus	Not done	Strongly positive	Not done	K. I. Rest	Very much improved
15 Dr. N. A., 38	Right hip. Duration at least 24 years	Limp since childhood. Acute pain and stiffness. Duration 9 mos Progressive	Typical flattened and deformed head of old osteochondritis of right femur. Marked cystic degeneration of head of femur	Monilia plus	Monilia plus	Not done	Strongly positive	Not done	K. I. and rest and extension	Subsidence of all acute symptoms

the monilia, and several of them have shown a high opsonic index. Six of them have improved on either iodine therapy, monilia antigen or both. No other tissue from bone or joint was cultured from any of these patients.

Iodide therapy next to the salicylic acid preparations has for many years been the most extensively used form of treatment for the chronic arthritides. Many cases have responded to this drug, and many other apparently similar cases have received no benefit. The tendency has been to consider that the improvement if any was due either to absorption of fibrous tissue or to the controlling of a luetic infection; but a third alternative, namely: fungus infection, should, I believe, be considered also.

Six cases of hypertrophic arthritis showing a monilia in the intestinal tract did not show positive blood reactions, and are therefore not included in this study.

GROUP III—INFECTIOUS ARTHRITIS OF THE HIPS

There are 5 cases in this group, all young adult males with involvement of one or both hip joints. The x-rays are suggestive of some subacute infectious process, but not in my opinion typical either of tuberculosis or of the usual pyogenic infections.

In one case a sinus tract led to the iliac crest, and in another a scar in the adductor region showed the site of exit of a small sequestrum several years ago. Motion was impaired and varying degrees of contraction deformity were observed in them all; but bony ankylosis had not taken place, save in one hip of a bilateral case. The duration varied from 2 to 12 years.

At exploration of the hip joint in 3 of these cases a fungus was cultured, and in the one with the sinus tract a non-hemolytic streptococcus also. Similar fungi were cultured from throat and feces, and in each of the respective cases, agglutination reactions were present and the opsonic rate was high.

Microscopic sections of bone showed chronic proliferative osteitis. No tubercles, giant cells, or fungi were seen.

Postoperative treatment with iodides, antigen, or both, gave excellent results.

GROUP IV—OSTEITIS OF VERTEBRAL BODIES, SACRUM AND ILIUM

Osteitis of the vertebral bodies, sacrum and ilium is a condition of which I can find no mention in the literature. It is unquestionably due to some type of infection, and the x-ray appearance in the sacroiliac joints closely resembles tuberculosis. It is, however, too widespread, involving the femoral heads, vertebral bodies and sacroiliac joints to be caused by tubercle bacillus.

I have two cases presenting this condition. The onset was slow, no sinuses or abscesses appeared. No biopsy has been performed on either case. They were both greatly emaciated, maintained a posture typical of sacroiliac disease and had severe pain in the back and hips which radiated down the thighs. The feces and sputum of both patients contained monilia, the agglutination reaction was present and the opsonic rate was high. The x-ray pictures showed a cystic degeneration or punched out appearance of the bones, particularly in the region of the sacroiliac joints. Massive doses of the iodides and monilia antigen have helped them greatly, and recent x-rays show definitely that bone regeneration is taking place.

GROUP V—OSTEOCHONDRITIS

An article by Harbin[15] makes a noteworthy attempt to group all of the conditions at present called by their discoverers' names under the head of primary or secondary osteochondritis according to whether a primary or secondary center of ossification is affected. The etiology of this condition is obscure and theories range from congenital malformations, trauma, neurotrophic disturbances and infection, to mycotic emboli.[16] It would seem that emboli, whether bacterial or mycotic in type, may by obstruction of the nutrient vessels during the growth period cause the bone deformities which are thus classified.

In this group there are five unquestioned cases of osteochondritis, three hip joints and two spines as diagnosed by x-ray and clinical history. All of these patients showed a heavy growth of monilia in the intestinal tract, had a strong agglutination reaction and the three of them that were examined showed a high opsonic rate. No biopsies were performed.

GROUP VI—PAGET'S DISEASE

Paget's disease was first described by Sir James Paget[17] in 1877, when he reported five cases. In 1883 Bowlby[18] first called attention to a similar condition involving one bone. In 1925 Lewin[19] reviewed the literature and collected 251 cases. Numerous theories as to the etiology of Paget's disease exist and little good is done by treatment. Inherited lues, trauma, trophic disturbances, calcium imbalance due to lesions of the parathyroids[20] and infections[21] have all been advanced as causes of this condition. I have not had the opportunity of examining sec-

GUINEA PIG INOCULATIONS

P. No.	Organism	Where from	Type of Inoculation	Appearance of Symptoms	Organisms Recovered from	Symptoms	Type of Organism	Remarks	Result
1.	Hemolytic streptococcus	Joint of arthritic	Intraperitoneal	About 6 weeks	Stool	Stiffness and soreness of joints. X-ray shows slight arthritic change in joints	Hemolytic streptococcus	Previous to inoculation stools showed no streptococci	Apparent cure after 3 months
2.	Monilia	Stool of infectious arthritis	Subcufaneous	About 2 weeks	Stool	Loss of weight. Generalized stiffness	Monilia	Previous to inoculation stools showed no monilia	Gradual recovery 6 weeks
3.	Monilia	Stool of osteomyelitis	Subcutaneous	About 1 week	Stool	Marked loss of weight Generalized stiffness	Monilia	Previous to inoculation stools showed no monilia	Gradual recovery
4.	Monilia	Bone of osteomyelitis	Knee joint	Four days	Stool, Joint gall-bladder	Marked loss of weight Swelling and stiffness of joint	Monilia	Disintegration of joint. Cartilage intact, but shows small eroded areas. Purulent fluid in joint. Purulent fluid in gall-bladder. Stool previously negative	Autopsy
5	Monilia	Throat of osteitis	Subcutaneous	About 2 weeks	Stool	Slight loss of weight and sluggishness	Monilia	Previously to inoculation stools showed no monilia	Recovery

tions of bone from either of our two cases of Paget's disease; but the usual histological descriptions of Pagetic bone correspond very closely to the picture seen in two of the cases of mycoosteitis or osteomyelitis which I have had under my care. Both of my cases of Paget's disease were treated by intensive iodide therapy and one of them by autogenous monilia antigen in addition. One patient has been completely relieved of symptoms for the past two years and the other shows great improvement, both symptomatically and in the texture of the bone as seen in x-ray. Both of them showed monilia in feces and throat, and both showed positive agglutination and intradermal tests and one of them a high opsonic rate.

As a matter of interest, the latter patient, after having been symptom-free for six months, reported recently that she had a return of pain. No treatment has been given for the past nine months and repeated stool cultures during this time were negative for fungi. At the present time the x-ray shows a definite increase in bone involvement and the stool cultures are positive for monilia. Therefore, treatment has been resumed.

Animal inoculations have been carried out on 5 guinea pigs in an attempt to determine what type of bone and joint disease is caused by monilia, and whether when a generalized infection is present the infecting agent appears in the intestinal tract. The accompanying table is evidence in the affirmative.

CLASSIFICATION

The organisms with which we have been dealing have been classified as follows:

Case No. 1—C. D. D., monilia probably albicans
Case No. 2—F. R., monilia probably albicans
Case No. 3—V., similar to case No. 4
Case No. 4—P., monilia—unidentified
Case No. 5—S. L. B., monilia probably albicans
Case No. 6—J. H., Hyphomycetes—unidentified

The classification of the fungi is attended with difficulty and uncertainty. Their growth characteristics seem to vary according to temperature, moisture, age and the number of subcultures. The fungi imperfecti or monilia may or may not liquefy gelatin and their sugar reactions do not seem to be always characteristic. We have noticed that an original culture failed to grow mycelia for a period of one week, whereas subcultures of the same organism showed a good mycelial growth in a few days.

It is, therefore, a particularly difficult task to classify the monilia, especially as the opinions of various authorities seem to differ on this subject.

Culture.—The cultures have been made on the ordinary Saboraud media or on a modification of it as suggested by Captain K. G. Kincaid, U. S. Army, retired. The cultures have been grown both at room and incubator temperatures. The fungi develop slowly and at times have not appeared for from six to ten days. Specimens have been cultured and grown in several laboratories for the sake of accuracy. Identification of some of these cultures has been made by Dr. Castellani, Col. Ashford and the Army Medical School as well as by competent men in San Antonio.

TREATMENT

The iodides have been given either by mouth in ascending doses in the form of potassium iodide or the sodium salt intravenously. All of my patients, with two exceptions, have shown a remarkable tolerance to this drug. Two cases were able to take 120 grains a day for over six weeks without exhibiting symptoms of iodism. I have found that small doses of neoarsphenamine seem to be useful and deep x-ray therapy is also being tried in several cases.

The antigen was first made according to the directions of Ashford in 1 per cent suspension and was given once every ten days. Recently it has been prepared according to the autolysation method described in Tice. The injections are given in ascending doses at weekly intervals. No severe reactions have thus far occurred and it is my belief that it is preferable to build up the dose without obtaining any reaction, save perhaps a local one at the site of injection. The maximum dose of a 1 per cent suspension has thus far been 1 c. c. There seems to be no criterion other than the patient's local and general condition on which to base the total amount of vaccine to be given.

Diet, I believe, is an important factor in treatment and I have in every case been guided by a strict or modified regimen as prescribed by Ashford in his management of cases of intestinal moniliasis.

After long-continued treatment as carried out at present with the iodides, antigen and diet, we find that we can usually eliminate the fungi from the intestinal tract and sputum. Most of these patients have shown marked clinical improvement and some of them I feel can be classified as definitely arrested cases.

I fully realize that many more cases must be studied and much more experimental work carried out before the subject of mycotic infection of bone and any so-called clinical entities of which it may be the cause become clarified. However, it is hoped that this paper may help to call attention to the possibility of other than bacterial infections of bone and joint and thereby increase our ability both to diagnose and treat these cases.

My sincere thanks are due to Dr. R. E. Scott, Cap. K. G. Kincaid of the R. E. Scott Clinical Laboratory, where much of this work was carried on, for their practical help and suggestions, as well as to Col. Bailey K. Ashford for his interest and suggestions.

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DISCUSSION *(Abstract)*

Dr. J. Albert Key, St. Louis, Mo.—When I first read Dr. Keating's paper I believed very little of it, and

unbelief is always stimulating. I was willing to accept his fungi in osteomyelitis, but from reading the manuscript, without seeing the x-rays I got the impression that the arthritis which he was seenig was ordinary chronic arthritis. The spine cases were hypertrophic and the multiple joint cases were atrophic.

Anyone who ventures a theory as to the cause of either type of chronic arthritis, treads upon dangerous ground.

Men in this country and abroad have been incriminating first one organism and then another. The majority of investigators believe chronic arthritis is caused by a streptococcus. In a considerable percentage of joint cultures from a large series of cases I isolated low grade staphylococci or diphtheroids and produced chronic monarticular arthritis by injecting these organisms into the joints of rabbits and recovered the organisms in pure culture from the rabbits' joints.

Consequently, I doubted that fungi could be the cause of chronic arthritis. However, the joints shown on the board are a different disease, and while they resemble ordinary chronic arthritis, they are true fungus infections of joints and must be carefully studied if a correct diagnosis is to be obtained.

I have never seen a fungus infection in a bone in which I made the correct diagnosis early in the game. I have always missed it and called it something else, usually osteomyelitis, sometimes tuberculosis and sometimes a traumatic injury to the bone. Dr. Keating's finding of fungi in Paget's disease will, of course, have to be confirmed.

I have seen one case (reported by Dr. Singer) which was diagnosed as due to traumatic injury, and elsewhere as a multiple myeloma. The patient developed empyema and a subcutaneous abscess. A pure culture of streptothrix was obtained from the abscess. Autopsy showed a streptothrix in the various bone lesions.

Dr. H. M. Michel, Augusta, Ga.—The term, actinomycosis, was introduced about 1870 by Bollinger to describe the disease of cattle, known as lumpy jaw. Since that time, many fungi have been described, as Dr. Keating said, by many authors and by no two employing the same classification.

I think it was Castellani and Chambers who divided these fungi into two large groups, the actinomycoses and the maduromycoses. Before that, long years ago, the disease spoken of as Madura foot and charged with being of fungal origin, had been known in India for many generations.

Dr. Keating points out that many of his cases improved under the administration of massive doses of iodide of potassium. That would seem to imply that many times we are dealing, for instance, in arthrodesis, with fungus infection. It must have been the experience of all of us that certain cases of arthritis in which we were unable to find focal infection, and unable to recover an organism, upon receiving large doses of iodide of potassium, frequently improved.

I was very much interested in Dr. Keating's suggestion that Paget's disease may be of fungal origin.

INJURIES TO THE VERTEBRAL COLUMN*

By HUNTER SWEANEY, M.D.,
Durham, N. C.

There is an impression that injuries to the vertebral column are infrequent. Those severe injuries producing marked symptoms with attendant paralysis are comparatively rare, while the greater number of cases following the ordinary modes of violence with often slight symptoms, are so mild at times that they are overlooked by patient and physician alike. That they do occur frequently enough to be seen by all of us is likely, regardless of our specialty, and I judge this audience to be composed of the general practitioner, the general surgeon, and the orthopedist. A consideration then of some of these injuries is in order, since there is an apparent increase of fractures in general, and the vertebral column is no exception.

This paper has to do with a consideration of the vertebral column as a whole, with its practical considerations, the mechanism of injuries to this region, and a review of a number of cases obtained from the history files of Watts Hospital over a period of years. The three portions of the column, namely, cervical, thoracic, and lumbar regions, are the ones included in the scope of this study.

Reviewing briefly the vertebral column as a whole, it is seen to consist of a well-supported bony column. The bodies are anterior, and the arch formed by the bodies, the pedicles and the laminae, is posterior. The direction of the column is due to the size and shape of the bodies and the intervertebral discs. Anteriorly, the column is convex in the cervical region, concave in the thoracic region, and convex in the lumbar region. Viewed from the front the bodies are seen to be smaller above, to increase gradually in size in the lower cervical and upper thoracic, and to decrease somewhat again to attain the largest size in the lumbar region. They are of more solid bone in the upper and more spongy in type in the lower weight bearing region. The discs comprise about one-fourth of the length of the column and consist of a central core, which is ball-like in a more yielding fibro-cartilagenous socket. It would be a ball-and-socket type of joint were it not for its limitation of motion from

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outside restraining forces. These restraining forces, in the main are the locking of the laminae and spines, tension of the ligaments opposite to the direction of motion, and the resistance of the intervertebral discs. The addition of these many segments and joints permit, in the aggregate, considerable range of motion which is greatest in the cervical and lumbar regions.

The anterior and posterior longitudinal ligaments are found, as indicated, in relation to the bodies. Arising from the arches are found the transverse processes, the articular facets and the spinous processes. The most important ligaments of support are: supraspinous, interspinous, and ligamentum flava. The transverse processes point horizontally, slightly backward, and upward in the lumbar, where they attain their greatest spread. They are here in line with the ribs and are in reality homologues. They serve as attachment for powerful muscles. The spinous processes are held firmly by their ligaments. However, they have some range of motion by elasticity. They point horizontally in the upper, downward in the middle, and again horizontally in the lower regions.

Theoretically, a force, if sufficient, entering the vertebral column from a direct or indirect source, will produce injury at its weakest area. When a force is applied to the longitudinal axis of the vertebral column, injury will take place at the point where the movable and fixed portions join, and where there is a change of direction. Such areas are the atlanto-axial, cervico-thoracic, and the thoraco-lumbar. It is a well known law that lines of force tend to travel in the direction of the applied force, but it may be modified by resistance. The articulations and discs of the column, while tending to absorb forces and to diffuse them, also concentrate them at the joints mentioned above. A force applied to the top of the head would travel to the cervico-thoracic region and pass out the column to reenter at the thoraco-lumbar region. Here then in these areas should be seen the greatest number of fractures. Falls upon the buttocks reverse the above condition, and the points in the spine nearest the origin of force are the usual sites of injury.

As regards the mechanism of fractures, in some instances, two things happen in sequence to produce a crushing fracture of the lower vertebrae: first, the reception of the force transferred to the body of the vertebra; second, acute flexion. Fractures of the transverse processes are due to direct violent force from without and to muscular action from within. The spinous processes and laminae are usually fractured by direct force. Soft tissue injury takes place with bony injury as well. Injuries elsewhere in the body show fractures at the insertion of tendons and ligaments and that they occur in the spine is obvious. Unfortunately, diagnosis is not easily made, and some of them are poorly understood. Hence, the controversy arises as to the part trauma plays in the production of arthritic lesions.

An x-ray diagnosis of osteo-arthritis of the spine is a common event, and it is often found in examinations other than of the spine. It is seen most frequently at the age of forty and above. It is generally agreed that trauma, even though slight, will exaggerate an old arthritis. If one studies the case histories, this condition is seen sometimes in individuals who have not had symptoms here, or in other joints of the body. It occurs most frequently in those following occupations which give repeated trauma to the spine, and in those with arthritic tendencies. Surely all of us are impressed with the paucity of symptoms in relation to roentgen findings. Lipping of the vertebral bodies may be well explained from faulty posture, especially in heavy individuals with pendulous abdomens, who to maintain a center of gravity accommodate by increasing the normal curvature in the lumbar region, with a consequent compensatory dorsal kyphosis. In addition, this produces pressure of the intervertebral discs, and in reality a chronic irritation ensues with the bone responding by the production of osteophytes around the vertebral margins. Especially is this to be seen as a late sequel of injuries which distort the joint surface.

From 1923 to 1931, 35 cases of injury to the vertebral column were found in the files of Watts Hospital. A gradual yearly increase was observed. Sixty-six per cent of the cases received their injury from automobiles, 26 per cent from falls, 3 per cent from football, and 5 per cent were from an unknown cause. The age incidence was from 3 to 79 years. Discarding these extremes the average age was 28.6 years. Males predominated in the proportion of two to one. Fractures of the bodies of the vertebrae occurred three times in the cervical region, involving the fifth cervical once, and the seventh cervical twice; four times in the thoracic region, twice in the first thoracic and once each in the eighth and ninth thoracic; the lumbar vertebrae 15 times with 4 fractures in the first,

5 in the second, and two each in the third, fourth, and fifth. Dislocation, or more correctly, subluxation, was found once in the fifth cervical and fifth lumbar.

Multiple fractures of the transverse processes were seen 9 times, and single fractures 10 times; 8 cases with 12 fractures on the right, and 11 cases with a total of 23 fractures elsewhere in the body were seen in four cases.

(1) Subluxation of the fifth lumbar with fracture of the os calcis.

(2) Eighth and ninth rib on left with four fractures of the transverse processes on the left.

(3) Fracture of the pelvis in four places with transverse processes and sacrum.

(4) Nasal bones, mandible and body of the first, second lumbar vertebrae and the right transverse process of the second lumbar vertebra.

In very few cases was the exact manner of the injuring force determined. As mentioned above, 66 per cent were acquired from automobile injuries, but without any definite mention as to the point of the body receiving the injuring force. Without exception those cases falling on the feet had fractures of the bodies of the lumbar vertebrae. Injury was so mild in two cases that it was not suspected and only came to light in two and six months, respectively, when backache continued and the physician consulted finally decided upon x-ray study. These were two cases of partial compression fractures of the body of the first lumbar and of the eighth and ninth thoracic. The patients had continued their daily work without interruption. Two cases were missed by x-ray study, due to the fact that only antero-posterior views were taken at the time of injury. Continuation of symptoms suggested a lateral view in one, and oblique in the other. Subluxation of the fifth lumbar with rotation was found in one, whereas, the other showed fracture of the right transverse processes of the second and third lumbar vertebrae.

Laminectomy was done twice for complete paralysis from fracture of the seventh cervical and first thoracic. The first showed no injury to the cord, but the operative note stated that the spinal fluid was under great tension. The patient left the hospital unimproved. The second laminectomy was done after a positive Queckenstedt test, and bone was found resting upon the cord. The patient is making a good recovery. In the series three deaths occurred, only one of which should rightly be attributed to the spinal injury. This was the case of a laminectomy. The other two were due to severe injury elsewhere, and were classified as deaths due to traumatic shock and loss of blood.

In conclusion, one should bear in mind that there are individual reactions to injury. For instance, two cases may have similar trivial accidents: one may have no demonstrable injury, and the other a decided fracture. Any injury involving the spine, even though slight, should receive thorough investigation, which should include both history and physical examination, and ofttimes roentgen study with preferably stereoscopic films. In injury, if the applied force is determinable, along with a consideration of the anatomy and mechanics of the spinal column, both recognition and treatment of the various injuries are greatly simplified.

DISCUSSION (*Abstract*)

Dr. E. Denegre Martin, New Orleans, La.—The treatment of the lesions occurring in fractures of the vertebrae is much simpler than the diagnosis. It makes no difference what the diagnosis may be or the extent of the injury, rest is the most essential requirement.

It takes a little courage to stray from the beaten path and by accident we often progress a step further. It was not altogether an accident which first induced me to use only the Bradford frame in fractures of the spine, but an accident gave me the opportunity of putting it into effect. A blind patient was allowed to remain at home, in bed, on his back. Pain when he moved forced him to keep quiet. He made an uneventful recovery, in comfort and in just half the time of others in the same condition.

Now we treat all such cases on a Bradford frame. The results are good, the patient is much more comfortable, the muscles are kept less rigid and regain their tone in much less time after the patient is allowed to get off the frame. Best of all, a sponge bath can be given every day. Just think what that means in this climate. Finally the only knowledge necessary is how to fit the Bradford frame. How many patients with fractures of the spine do you suppose have been the victims of poorly applied plaster jackets? Plaster has no place in the treatment of fractures of the spine and pelvis.

Dr. F. R. Price, Charleston, S. C.—In all the injuries to the vertebral column, though the roentgenograms may not show a lesion, there is a possibility of rupturing the nucleus pulposus in the intervertebral discs with an escape of its gelatinous constituent. As a result, the bodies of the vertebrae rub together, become eroded and finally deformity sets in. Also we should bear in mind the possibility following these injuries, of Kummell's disease, or post traumatic spondylitis, which may be defined as the delayed crumbling collapse of the body of a vertebra following injury. We must also bear in mind that in these injuries to the vertebral column, the patient may have had some pre-existing disease of the vertebrae such as arthritis deformans, or Pott's disease.

As a prophylactic measure, even comparatively slight injuries to the vertebral column should be interpreted and treated as spinal fracture in all doubtful cases.

THE RELATION OF THE CITY TO THE SCHOOL CHILD*

By W. H. ROBIN, M.D.,†
New Orleans, La.

The relation of the city to the school child is a most vital one. No municipal health officer ever functioned in his professional capacity whose official acts were not closely interwoven with those of the school child.

The very basis of public health work is woven about the pupils of our schools. It is a prime factor in the control of communicable diseases. These diseases are contracted through contact with other children in schools and unconsciously carried home by pupils who innocently give origin to many new foci by exposing the adult members of their households.

The annual school session in New Orleans controls the rise and fall of communicable diseases. It is an established fact that, for the past thirty years, communicable diseases have begun to increase in number about two or three weeks after the opening of our schools. The peak is usually reached through February, March and April. Within two or three weeks after the close of the school session, there is always a sharp decline in the number of reportable diseases. They remain dormant during the vacation season and never fail to flare out anew upon the reopening of school session.

This is, of course, due to the close contact of pupils while they are in classrooms. The various air-borne diseases are thus furnished with an efficient medium of transmission and always find a receptive field in the invariably congested noses and throats of school children. While contact may be as great in summer, it is an outdoor proposition with plenty of fresh air and strong sunlight that combat any organisms that may be thrown off by an infected child.

The city spends about eight or ten thousand dollars annually in furnishing smallpox vaccine for the protection of school children. We feel that this amount is well spent when we take into consideration the fact that we have approximately 150,000 school children in New Orleans, among whom smallpox has never appeared, except in four or five instances where certificates had been indiscriminately issued by private physicians who were misled either by pseudo "takes" or through a desire to be lenient. We get quite a few cases of smallpox among infants and among children of the preschool age, but it is indeed a rare occurrence to encounter a case in the person of a school child. This is due to the thorough manner in which school vaccination is enforced in New Orleans, not only by the Health Department, but by the various school authorities.

The city also provides other vaccines and serums for the protection of the school child. We administer toxoid for the prevention of diphtheria, and antityphoid vaccine for the prevention of typhoid.

All children excluded from school by school medical inspectors, school nurses or teachers, are visited at their homes by our medical officers and, in the instance of cases that require quarantine, histories are taken and quarantine effected by our public health nurses. Other children of the infected houses are required to remain away from school unless they move to a new address, after which they are permitted to return to school only on expiration of the incubative period of the disease in question. Concurrent disinfection is practised in the various homes by the public health nurses. Several thousand of such calls are made during each school session.

The Health Department has been, for the past several years, advocating the inoculation of all school children in order to immunize them against diphtheria. This is as important to school children as is the prevention of smallpox by vaccination. Statistics prove that a larger number of school children, throughout the United States, are killed by diphtheria than by smallpox. This, in itself, should be a most forceful argument in favor of toxin-antitoxin or toxoid, both of which offer prolonged immunity against the invasion of diphtheria.

The City Health Department has participated in quite a number of annual Health Round-Ups held at various school centers. Hundreds of children have been immunized against typhoid and diphtheria, and I believe that, through the efforts of our recently organized Bureau of Public Health Education, it will be only a short time before every pupil is protected against the invasion of these diseases.

It is also our intention to devote attention to similar inoculations and protections among children of the preschool age. If we can be successful in obtaining the aid of the majority of parents in such an endeavor, there will be fewer

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cases of all diseases because the susceptibility will be reduced among our pupils.

In conclusion, I can state with assurance that the general health conditions of the school children in the city of New Orleans are equal to, if not better than, similar conditions in other large cities throughout the country.

Discussion follows paper of Dr. O'Hara, page 1084.

THE RELATION OF THE STATE TO THE SCHOOL CHILD*

By JOSEPH O'HARA, M.D.,†
New Orleans, La.

The relation of the state to the child is agelong. It has existed from the early organization of groups which later grew into nations. The reason is clear. The genius of the ancient nation was war. It conquered territory and extended its borders to meet the demand of an ever-increasing population or the whim of an ambitious ruler. If it became lazy in defense it succumbed to a more virile and war-like neighbor.

Training of the male population was the most important function of the government. Rulers accepted and the people acquiesced. The experiment of Sparta is familiar to everyone who has read of ancient people. They took at a tender age the boys of Spartan parents, trained them in the arts of war and developed in them physical endurance unequaled in any surrounding country. They were truly the wards of the state. But even this most drastic governmental experiment did not save Sparta.

Each nation, even those of the Middle Ages, evolved a system for its own preservation. It meant training the boys and men in measures aggressive and defensive. With this as a heritage small wonder that modern nations cling to armies, navies and air fleets as indispensable adjuncts to safety.

But happily, simultaneously with the rise and fall of nations, there grew in the hearts of men an ever-increasing purpose to take part in the government. England is perhaps the best example. For hundreds of years the principle of representation in the government of the kingdom would be established in some form, lost sight of in the reign of succeeding sovereigns only to be revived and again established. In the Nineteenth Century a representative government was assured, the result of the struggle through the ages.

But long before this victory was won in England, men of like minds, pioneers, had left the mother country for a home in the western world. In the new land they realized, as never before, the responsibility of each individual in the affairs of local government. They acknowledged the king, but made their own laws. This, in turn, brought a sense of obligation to train the youth for intelligent service as leaders and members of a democratic society. This was the dawn of the public school in America.

The schools of New England were rigid in discipline. They offered what we would call a stiff course. In other colonies, while the idea was accepted, the plan was not so fully carried out. In the far South, because of geographical and industrial conditions, the school was often a haphazard affair, but the planters had high ideals of education for their own children, sending the boys to Europe and employing governesses for the girls of the family.

Democracy and ignorance can not exist side by side. They are foes. Therefore, the first duty of a democratic state is to provide at least elementary training for its future citizens. Every colony as it became a state, and every new state, assumed this obligation as a measure of self-preservation. Public schools which offered training to every child were inaugurated. A study of the three R's was stressed at first, but changes in the school structure soon demanded more. At present every state offers a grammar school education. These schools are supported by public funds. They are directed by a state department of education with such jurisdiction as the law grants. This oneness of judgment and purpose on the part of 48 units of government with millions invested in buildings and millions of dollars annually provided for maintenance, shows conclusively the responsibility which the state feels for the school child. In addition, high schools are provided for the continuation of the grammar course, and in some places vocational training is offered and even special classes for the handicapped are conducted. Compulsory attendance in many states is required, at least until the elementary grades are completed.

Perhaps the most significant of the ever-widening scope of the states' responsibility lies in the health protection which each state assumes as its duty. Every health code has a chapter on communicable diseases, and a large proportion of

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†State Health Officer.

this is devoted to means for the protection of the school child from diphtheria, smallpox, scarlet fever, poliomyelitis and lesser diseases common among children. In these rules the state makes it obligatory that the physician report promptly any case in his practice, or, in the event there is no physician, the principal of the school, the parent or whoever is in charge of the child. Every morning in the bureaus of the several states, reports of cases of disease among children are gone over and, if remedial action is necessary, the state board of health may put into effect measures of protection. If they prove an expense, the community is under the law responsible for the payment of the amount legally expended.

There are sections of each state code equally explicit concerning school buildings. The required amount of light, air and space is set forth in detail, likewise facilities for the formation of habits of cleanliness. A safe supply of potable water must be provided and safeguarded. The bucket with the dipper is no longer seen in the rural school any more than the "Blueback Speller" of unhappy memory.

It is needless to cite details of the care exercised by the state over the 26,000,000 school children of this country. Whatever the medical sciences have taught concerning the preservation of the health of the child and the prevention of disease, the state has endeavored to translate into regulations for guidance of school authorities, teachers and parents.

In Louisiana, systematized health rules, differentiated as to grades, have been made a part of the course of study, not as a subject to master, but as a guide to the daily routine of school and home.

The state has done much to preserve and protect. Local physicians and dentists are encouraged to meet local requests for the physical and dental examination of the school child. Individuals and communities are urged to depend on the knowledge and help of the physician and to obey his instructions. But with all these efforts the state has just begun to explore possibilities. At present the opportunities seem unlimited. The physical status of many children determines their mental attitude, which may be inimical to the welfare of the state. How far are we responsible for delinquency, even crime, in young people? I think the state can establish measures for mental and physical health without prejudice to any ideals or principles concerning the relation of the state to the individual. The administrative machinery for carrying out the program should include the local governmental agencies and representatives of the teaching and medical professions.

I am sure you share with me the opinion that the state should act in emergencies and that no school child should be neglected through ignorance or inefficiency.

There are many angles to this subject. I have discussed only one.

DISCUSSION (*Abstract*)

Symposium, The School Child, Papers of Dr. Robin and Dr. O'Hara.

Dr. E. L. Bishop, Nashville, Tenn.—We can organize all sorts of public health programs in municipalities that have for many years had public health departments. But we have in this country about 3,000 counties, and only about 450 of them with county health departments, and in many instances they have only the minimum personnel that could constitute a county health department. In focusing our interest around the question, of child health, and particularly of school health, we should not forget that a program of school hygiene is not possible for the rural child until we progress further with rural health organization. Moreover, there is danger in thinking too much of a single element of public health, or a single age group, in dealing with public health problems. There have been in this country several examples of dealing with public health from an age group classification that were more or less unfortunate. It is well enough to think of the school child and to organize a program of public health for the school child; but it is more important that the child secure his immunization at the proper time. Is not the first year of life a better time than the school age to secure his immunization; and is not the preschool age the age of highest injury in all child life? Should we not try to provide the facilities which will afford immunization before the school age, indeed in the age of infancy? We have dealt with the school child and the school group because it was convenient for us to do so, because they were gathered together in large groups and we could do it economically.

My plea is that we shall push our rural health organization, so that we can extend our public health group back into the earlier age groups of childhood and produce a well-rounded health program rather than a school health program.

Dr. M. A. Fort, Bainbridge, Ga.—My county (Decatur County, Georgia) has a population of about 23,000 and Bainbridge, the county seat, has about 6,500 people. We have compulsory vaccination for smallpox and diphtheria in town and persuasive vaccination in the County. We think our results have been good, because we have never had a case of diphtheria, smallpox, or typhoid in anyone who has been immunized during the seven years that I have been there. We had no typhoid this year, though there was considerable typhoid in every county near us. All our schools have sanitary privies, though on my inspections I often find them insanitary, due to lack of attention. We know we have secured good control of these diseases, as well as of hookworm disease and malaria.

But at intervals such diseases as whooping cough, measles, influenza, mumps and scarlet fever come around, and they usually run through the schools in spite of every effort I make. Will some of the experts please tell me how I can prevent it?

I recall an article that appeared in the *Journal of the American Medical Association* which gave essentially these facts: 100 children who had been exposed to whooping cough more than a week before had slight cough and evidence of throat irritation, but certainly none of them could be said to have clinical whooping cough. Each child was induced to cough directly at a culture plate held a few inches before his mouth. The plate of every child who subsequently developed whooping cough showed positive colonies of whooping cough germs. Ten days later when 100 children were whooping and some of them vomiting, plates were again exposed to their coughing. But only 75 per cent of these plates proved positive. A week or more later when all the children were in the throes of severe whooping and vomiting, plates were again used. But now only 25 per cent were positive. This proved that in the early stages, before the children were really sick, they were blowing out contagion at every breath; but after the disease was thoroughly established, the greater part of the danger of infecting others had passed. In other words, this disease is most communicable before it is diagnosed. The same thing is true of the other highly infectious diseases.

Dr. L. L. Lumsden, New Orleans, La.—Until we have a vaccine to protect against whooping cough, measles and mumps we are nearly helpless in undertaking to control them.

In counties organized with whole-time health units I have seen very energetic campaigns to control measles after measles had become widespread over the county. My personal opinion is that it is largely wasted effort. In a neighboring county, where there was no unit and where nothing was done, measles ran the same course as in the county where strenuous efforts were made to control the infection. The best time to have these diseases is in the public school age, between 6 and 20. If having these diseases is our only means of securing immunization, why not go ahead and have them?

Dr. Arthur T. McCormack, Louisville, Ky.—I do not believe we have any right to permit any group of children to have any disease, or to say that they ought to have it at any particular age, as long as it is possible to prevent it.

We are not going to solve these problems until we have created in our public a health consciousness. That is what we are doing by education in the school, so that the individual who has a disease in his system not only submits himself to the quarantine that is compulsory by law, but actually isolates himself so that he does not spread the disease because he feels the importance of such action.

I recently saw a very fine piece of work done in Berea, where much damage had followed an epidemic of measles. I had formerly seen an epidemic of measles there at a time when practically the whole community was in bed with an epidemic of malaria. This year all of the school children who were exposed to measles were given 20 c. c. of serum and the disease was stopped. In Kentucky we have a vaccine that we use very extensively. It does not prevent influenza and bad colds, but it reduces them very greatly, and it certainly reduces the sequelae and complications that cause death from them. We make a great deal of it and distribute it to our physicians and health authorities. It is inexpensive and used frequently.

We are giving our urban children today a protection that we are not giving to our rural children in many of our governmental bureaus; we have not any right to discriminate in favor of one against the other. The wealth of the cities must be taxed to give to the children of the country an equal opportunity for education, and their schools must be made as good and their health protection must be made as effective in every home in America.

Dr. C. E. Waller, Washington, D. C.—I believe that any effort to control the spread of measles, mumps and whooping cough is absolutely futile. But when we have an outbreak of whooping cough or measles or influenza we can accomplish a great deal, not by trying to isolate the cases and quarantining contacts, but by quarantining the well babies, keeping the babies out of the way so far as possible until the school children have had the disease and have passed the infectious stage. We can accomplish a great deal, too, in cutting down the death rate from these diseases by trying to prevent the secondary pneumonias.

It is possible in these days to anticipate an outbreak of measles or whooping cough. On one occasion that I know of it was possible in a certain state to predict months ahead in some of the communities an outbreak of measles. A systematic campaign was instituted immediately to warn parents to be on the lookout for this outbreak and to teach them that the real danger is pneumonia. Effort was made to have mothers prepare their children by feeding them a little more than they would receive ordinarily, by seeing that they received a sufficient amount of sleep, and by cutting down their play, not letting them wear themselves out by too much play.

We should look a little more to the content of public health teaching in our school health program. We have been inclined to stress personal hygiene to too great an extent. We are making our children "personally-health-minded," but not sufficiently "public-health-minded." We are making our children believe and have faith in some things that may not be true by teaching them that if they take a bath so many times a week, if they brush their teeth so often, if they sleep with their windows open, if they eat certain kinds of food and take certain kinds of exercise they are not going to be sick; that in effect "an apple a day keeps the doctor away," and so forth. I believe we should strive to be truthful and that we should give such information to our children for what it is worth.

Let us tell the children about the diseases that cannot be prevented through personal hygiene and teach them what they must do and the community must do to protect them from these diseases.

Dr. C. C. Slemons, Lansing, Mich.—In the Northern part of the United States where I reside, measles is a more deadly disease than it is in the Southern states and the same is true of whooping cough. We have our measles usually in the late winter or early spring, accompanied by a very large number of fatalities, due to complications. We are endeavoring this year to combat this high mortality by advising the use of whole blood and are furnishing the physicians of Michigan bottles of sterile sodium citrate with directions for

use, hoping that its use may prevent many of these untimely deaths.

I agree very much with my friend Lumsden that with our present knowledge of whooping cough and measles we can do very little in stopping an epidemic of either of these diseases; however, we can do good in our various communities by teaching that these are not grandmother's diseases but diseases with a high mortality which should be in charge of competent physicians.

We are supplying the physicians with the necessary means for giving whole blood for measles prevention. We are sending out a complete package and furnishing directions for its use. I hope at some future date to be able to tell you about the results obtained from this new activity.

The reaction of the physicians to the movement has been excellent. We have had no criticism of it. The State Society, at a recent meeting at Pontiac, favored it.

Dr. J. L. Jones, Louisville, Ky.—The daily inspection of school children and the removal and isolation of those found ailing is most important in the control of communicable diseases. When possible this inspection should be made by either the health officer or nurse, but, with a little instruction, teachers may do it very effectively. In turn, parents should be urged to have such children attended by the family physician and the child should not be allowed to return to school until the attending physician or health officer certifies that he is no longer in an infectious condition.

When we consider that upwards of 97 per cent of all deaths from whooping cough and approximately 85 per cent of all deaths from measles occur in children under 5 years of age, it would seem that the control of these two diseases is of greatest importance in this age group. It seems to be the consensus of opinion among those who have had a wide experience in dealing with these diseases that whooping cough vaccine and convalescent measles serum, or whole blood, are proving beneficial in the prevention of whooping cough and measles, respectively. The State Board of Health of Kentucky is urging the use of these preparations among all children under 5 years of age who have been exposed to these diseases.

Dr. B. J. Lloyd, Washington, D. C.—I must agree with my colleagues of the U. S. Public Health Service as to the practical impossibility of controlling measles and whooping cough by ordinary isolation methods. Contrary to what is usually taught, I believe that measles may be conveyed by a patient after the fourteen-day period of quarantine, provided the patient has an acute coryza. We know, of course, that the disease is contagious for some time before the eruption appears.

I should like to ask what evidence there is, if any, that immune serum will protect against measles for more than a few days (passive immunity) unless the child is exposed to the disease about the same time the serum is administered (within a few days). I believe that in measles we require the administration of both an antigen (possibly the living virus or a killed culture) and an immune serum at the same time to produce permanent (active) immunity unless the child is exposed.

Whatever may be the causative agent of influenza, I believe that a diplo-streptococcus is the thing that kills; it may be a secondary invader or it may not. This organism, obtained preferably from the blood of a patient with influenza and kept virulent for rabbits, will, in killed cultures, prevent a fatal result if it can be given a few days or a few weeks before the disease is contracted. Such protection will last throughout at least one season. However, a vaccine made from a culture which has lost its virulence is probably useless or nearly so.

Dr. W. F. Draper, Richmond, Va.—The use of whooping cough vaccine in the treatment of the disease is not definitely proven to be of value. Some physicians think that it is helpful, while others feel that it is not. There being a division of opinion, I have suggested to the various physicians that they do as they see fit and have suggested to the various members of the laity who inquire that they follow the advice of their physicians. But one statement I always make without equivocation is that whooping cough vaccine has absolutely no value as a prophylactic. Someone here made the statement that it was proven that whooping cough vaccine was a preventive. I want to be advised correctly as to that.

Dr. J. A. Hayne, Columbia, S. C.—We have found in South Carolina that the best way to have our schools sanitated was to work through the State Board of Education; not to lay too much stress upon the State Board of Health, but to cooperate with the State Board of Education.

At the present time through the Engineering Department a complete survey is being made of all the schools in the state, this with the full cooperation of the State Board of Education. Our Engineering Department visits the schools, gets in touch with the trustees and frequently takes them along on the surveys. If it is a county that has a whole-time county health officer we ask him to make a similar survey. If it is a county without a health officer, the survey is made by our Engineering Staff. This survey of all the counties is to determine if they are carrying out the laws of the state.

We have in South Carolina a law providing that all school children shall be vaccinated before they attend school. In the cities of the state we have 100 per cent vaccination. Twenty-five hundred assembled in a municipality we call a city. Of course we are a "backward" state, but when we study a great and enlightened state like Ohio, where they do not have compulsory vaccination, we find they had 15,000 cases of smallpox last year while we had 150. This is perhaps due to our being "backward" in having smallpox as we are backward in everything else!

Our laws require that the schools shall be properly ventilated, properly heated, that they shall have a proper water supply and that human excreta shall be disposed of safely. These laws have been on the statute books for many years. They are not obeyed and now we are endeavoring for the first time, through the Board of Education, to find out how nearly these laws are being carried out. We find they are not being carried out to any extent in the rural districts.

Dr. George A. Hays, Pine Bluff, Ark.—We are centering our efforts on child health in Jefferson County, Arkansas, for two reasons: first, we feel it to be one of our most important public health problems; and, second, it is the best way we can sell public health generally to the individual whose influence will bring the money necessary to carry on public health activi-

ties. To make diphtheria immunization compulsory we use an enabling act which had been passed for another purpose. The state law of Arkansas gives the county board of education "supervision and direction of the rural schools." That organization was entirely cooperative. So I prepared a resolution which that group passed "authorizing the health department to enforce complete diphtheria prevention," which, with the further cooperation of the prosecuting attorney of the county, who said that made it a law, gave Jefferson County 100 per cent immunization against diphtheria in the rural school children. While I have not the accurate figures available now, I believe we have reached approximately 40 per cent of the preschool children by having them brought to the school at the time the immunizations of school children were begun. That is not true of Pine Bluff, a town of 25,000, the largest in the County. It was felt at the time the immunization started that the city school child had easy access to the druggist and the physician, and that the community at that time had not been sufficiently led to institute compulsory immunization in the city schools. But now, after three years' work in the rural sections, the Parent-Teachers' Associations are urging, and the City Board of Education is seriously considering, making it compulsory there.

The public health program must be fitted to the community. It was stated that in New Orleans nutritional work was being considered as relatively unimportant. Anyone working with rural school children knows that that pays the biggest dividends of any public health work. It is the thing that improves the child's health, and while it may not make him not susceptible to disease, it fits him so that he may not succumb to disease.

Dr. J. H. Janney, Annapolis, Md.—With reference to the control of communicable diseases in schools, Dr. Jones has mentioned the advisability of having daily inspections by the teacher or by the health department. Of course, this is not always possible; and I am just wondering if it is not important also to try to educate the parent through the Parent-Teachers' Association, to keep children at home when they are sick; I mean even when they have common colds.

Dr. C. R. Keiley, Richmond, Va.—We have the opposition of the medical profession to free immunization everywhere.

In Virginia, in 1927, 60,000 of 212,000 immunizations were paid for at the rate of 50 cents for the three treatments with antitoxin. We did not have a toxoid then. In all cases where the parents could not pay, it was done free; but the proportion of the population immunized, where 50 cents was charged, we found was just about as high as when we charged nothing. When the fee went to a dollar, we got 35 to 40 per cent less. When it went to $1.50, it was still lower. And when we went to $2.00, we got less than 30 per cent of the school population, and virtually no preschool.

We held clinics at the various schools. Where there were one- and two-room schools the school busses took the children to a larger school; and we had always a minimum of 50 at a time for immunization. The physician was always sure of getting from four dollars up for half an hour's work. The Health Department furnished the toxin-antitoxin. When the individual did not pay the fee some organization in the neighborhood paid it. There were few charity cases, that is charity so far as the physician was concerned.

Dr. C. H. Webb, Shreveport, La.—The cough plate method for the diagnosis of whooping cough as advocated by Sauer was used in the Pediatric Clinic at the University of Chicago. Our results were disappointing; we found that we could place more reliance on the clinical evidence than on the plate method of diagnosis.

Another point relating to the school child which has not been discussed is commanding increased interest. There is a condition which is more serious than most of those discussed, causing more deaths than whooping cough, measles or typhoid fever. That condition is tuberculosis.

I am particularly interested in childhood tuberculosis, the importance of which has been demonstrated by surveys made in recent years, especially in Massachusetts. It was shown in that survey that from 0.5 to 1 per cent of school children have active pulmonary tuberculosis and 2 per cent have active hilum gland tuberculosis.

Childhood tuberculosis has been related to the active tuberculosis of the adult by Myers and other workers, who state that adult tuberculosis does not occur unless previously there has existed an initial or childhood infection; further, that in families in which there is active adult tuberculosis, from 60 to 90 per cent of the children will show evidence of tuberculous infection, demonstrated by positive tuberculin reaction, whereas in non-tuberculous families there are usually less than 10 per cent positive tuberculin reactions among the children.

This means that approximately one-half million children of the school age in the United States have active tuberculosis. From this group will be recruited most of the adults who will have active consumption and maintain the tremendous mortality.

When a case of active adult tuberculosis is discovered, every child in the home should be isolated from that individual; either remove the adult from the home or take the children away and place them in preventoria or with relatives, where they are not in contact with active tuberculosis. Further, a comprehensive program such as has evolved in Massachusetts will eventually be adopted elsewhere, whereby, through routine tuberculin testing, those children who have tuberculous infection can be diagnosed. X-ray examinations of these will determine which children have active tuberculosis, and these can be taken care of in preventoria or in homes away from other children.

Dr. L. L. Lumsden, New Orleans, La.—Immunization is distinctly a business proposition. If there is to be a fight about it, the fight is not between the public health agency and the organized medical profession, but between the people and the objecting medical profession. If we can immunize children against diphtheria for 50 cents per capita, and if the citizens prefer to go to a physician's office and pay five, eight or ten dollars, all right. As a member of the official health family, I do not care who does the immunization, just so it is done. It is for the people to decide whether they want the health agency or their physicians or private physicians organized in groups to do this work for 50 cents per head, or to pay a physician, out of generosity of heart, six or eight dollars to immunize the children.

It is between the people and organized medicine, and the people are going to decide.

Dr. O'Hara (closing).—I wish to stress the invaluable worth of a well organized, properly functioning whole-time parish (county) health unit.

We have 32 of these units in our state and by their preparedness to act at a moment's notice, outbreaks or epidemics of communicable diseases or other conditions which might otherwise cause great distress are so promptly handled that many times control of the situation is effected before the community is even aware of any disturbance. These units not only have constant supervision over their own parishes, but can be mobilized in part or in their entirety for service in adjoining parishes or anywhere in the state where there is no unit, should the occasion develop. In this way we do not feel any alarm because we believe with such an organization we can handle emergencies as they may arise. A case in point was noted some months ago when an outbreak of typhoid fever occurred in one of our oldest towns in southwest Louisiana where no unit is in operation. Immediately we borrowed a neighboring unit and put sanitary measures into effect and almost like magic sanitary privies began to go up and other insanitary conditions were corrected with the result that the situation was quickly in hand. When we appealed to the Lion's Club, the Business Men's Association as well as the Medical Society and explained existing conditions, we received the heartiest kind of consideration and they manifested keen interest and a desire to cooperate in stamping out the infection. This same attitude was also exemplified by local authorities and other organizations.

RESULTS FROM FIELD ACTIVITIES IN TUBERCULOSIS CONTROL IN TENNESSEE*

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Before presenting the field experience and evaluation of the Tennessee tuberculosis control program during the past four years, it is desirable to sketch in, as a background, the general problems involved and the salient points of the program itself.

The Problem.—Tuberculosis is a major health problem of Tennessee. This is evidenced by the fact that the death rate for 1930 was 116.5 per 100,000 population as compared with a rate of 76 for the United States Registration Area. The rate for the negro race is over two and one-half times that for the white. These figures for 1930 were, respectively, 250 and 86.8 per 100,000 population. Though the state's death rate has been reduced considerably during the past decade, there is still an average of 3,000 deaths per annum from tuberculosis, and it is estimated that there are at least 30,000 tuberculous patients.

Solution.—An organized attempt to control tuberculosis as an activity of the State Government had its beginning in 1927. Neither at that time nor at the present do there exist any state owned or operated hospital facilities for the care of tuberculous patients.

Obviously, adequate hospital facilities for the state would entail the expenditure of an enormous amount of money, and if sufficient preliminary investigation and study were not given the matter, such hospitals might prove of minimum value in a control program. Hospitals are essential in controlling tuberculosis, but a reliance on these alone is believed to be fundamentally and economically unsound. There are other essential elements in any tuberculosis control program. These will be discussed subsequently.

Control practices are often centered around hospitals with very little consideration given to the other essentials; consequently, only manifest tuberculosis is treated and infection along with most of the very early cases are neglected. An analysis of the records in the majority of sanatoriums reveals the fact that a large number of patients are found to have either moderately or far advanced disease at the time of admission. In all probability, such patients have had the disease for at least one year prior to that date, and in the meantime they have infected other persons with whom they have come in contact, especially those living in the same household. It is through a field service operated in conjunction with practitioners of medicine that these contacts are examined and kept under observation in order that other cases of tuberculosis may be detected at the earliest possible moment. Then again there is a group that constitutes one of the greatest sources of infection, yet is one which cannot be ordinarily hospitalized. Reference is made to persons in the old age group who have the chronic fibroid type of tuberculosis. They have had the disease for years, but the symptoms and effects of the disease are not severe enough to force them to take treatment, and they continue with their work, probably infecting many with whom they come in contact.

These and other considerations were the deciding factors in the development of the present control program which attacks the problem from

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the periphery rather than from the center. It is believed that such a program will provide the initial stage which will serve as a basis upon which a more balanced program, including one of hospitalization, may be evolved.

The Program.—The program, which is essentially one of field activities, has been developed with the following objectives:

1. To define the problem of tuberculosis in Tennessee in as specific terms as possible, in order that the further development of control measures may be specific in its approach, based on an analytic study of requirements.

2. To push back the date of diagnosis of cases of tuberculosis to the earliest possible moment.

3. To carry on educational activities relating to the control of the disease.

The chief features of the program are:

(1) The conduct of tuberculosis case finding clinics throughout the state.

(2) The rendition of consultant service to rural physicians.

(3) The provision of nursing follow-up service.

(4) A comprehensive study of the hospital requirements.

The primary object of the clinics is to uncover cases of tuberculosis not known to physicians, and particularly those cases in which the disease is in its incipiency. Since private physicians cannot ethically solicit patronage, it obviously becomes the duty of some organization to undertake the responsibility, not only of finding the disease in the earliest possible stage, but also of placing and maintaining persons suffering from the disease under medical care. Thus it is seen that the health department serves three essential functions: (1) To act as a case finding agency; (2) to place cases under medical care as soon as diagnosed; and (3) to serve as a connecting link between cases and physicians.

Through the follow-up nursing service, physicians are enabled to have such details carried out in the home as are generally necessary in caring for a patient, and also in preventing the spread of the disease. This service is rendered only in instances where it is requested by the family physician, and always under his written orders.

Clinic Clientele.—The selection of individuals for examination at the clinics constitutes a critical factor determining success or failure of a plan. In the Tennessee plan, the clinic clientele is chosen essentially from the following groups:

(1) Contacts of known cases of tuberculosis.

(2) Members of a family or household in which a death from tuberculosis has occurred.

(3) Individuals referred by physicians as tuberculous suspects for a definite diagnosis.

(4) Individuals examined at a previous clinic returning for re-examination.

In locating the first two groups full use is made of the mortality and morbidity records of the local and state health department.

A significant factor in connection with the field clinics is that particular emphasis is placed on the investigation and examination of a family as a unit rather than the individual. Another point in connection with the clinic, which, from an administrative standpoint is believed to be of paramount importance, is the fact that all findings and diagnoses are made known only to the family physician. In order for a patient to obtain information regarding his condition, he must report to his physician. This policy has been adhered to strictly, and it is believed to be responsible for much of the success of the field control program.

There are forty-three counties of the state which have full-time health service. In these counties tuberculosis control is considered a local problem. The organization of clinics, and subsequent follow-up service, are functions of the local health department personnel; the State Department furnishes only the services of clinicians and technicians. Regular monthly clinics are conducted in these counties and the schedule is so arranged that the clinics for a particular county are conducted on the same day each month.

In the counties not having full-time health service, the organization of clinics and the follow-up service is performed by members of the nursing staff of the Section of Tuberculosis Control of the State Health Department.

Childhood Tuberculosis.—The program includes due consideration of childhood tuberculosis. The Mantoux, or intracutaneous, test is the method employed and a standardized tuberculin is used. Children fourteen years of age, or under, are not admitted to a clinic unless they have been tested at least forty-eight hours previously and show a positive reaction. The desirability of having all known child contacts examined promptly is emphasized.

Roentgenography.—When the field activities were first begun x-ray facilities were not available, due to the fact that most authorities were rather skeptical as to the value of portable units in obtaining satisfactory roentgenograms. Two years ago a portable x-ray machine was given a trial and proved very satisfactory; con-

sequently, two additional machines were purchased so that now each clinician of the state has an x-ray machine and a technician at his service. These machines are very compact and can be transported easily in an ordinary automobile. The majority of the small towns and villages of the state are equipped with electric current, and there are few places where clinics are conducted where it is not possible to use the x-ray machine. Roentgenograms are not made of every person attending clinics. Such a procedure would be very costly and the use of the x-rays in many patients is not necessary. The selection of patients on whom roentgenograms are to be made is left to the discretion of the clinician.

Results.—An attempt was made in a recent paper* to evaluate the field service statistically in terms of changes in physical findings upon re-examination of a group of 1,944 patients as compared with the findings on initial examination. In this discussion an attempt will be made to indicate the results of the field activities, not from a statistical point of view, but from the standpoint of acceptance of the field program by those most immediately concerned: practising physicians, health officers, patients, and the public generally.

Effect in Organized Counties.—When the field control program was put into effect, four years ago, little or no attention was given to tuberculosis control in those counties which at that time had full-time health service. The average number of tuberculosis patients and contacts under supervision per county were few in number. Clinics were not conducted, and the only method whereby the units obtained patients for follow-up service was through the reporting of cases by physicians. During the fiscal year ending June, 1931, there were 10,882 persons under the supervision of the thirty-seven units. These were either active cases of tuberculosis, suspects, or contacts; this is an average of 300 individuals per unit for the year. As mentioned before, at least one chest clinic is conducted per month in the organized counties. Some have as many as three clinics a month. In the beginning some difficulty was encountered in convincing the health officers of the need for including a reasonable amount of tuberculosis work in the general health program of the county. Now the difficulty is in keeping the health officers from requesting an excessive number of clinics per month, as it has proven to be one of the most popular services of a county health program. One factor employed in determining the number of clinics a county should conduct is the ability of the nurse, or nurses, to follow up all known cases and contacts. It is of little value to conduct clinics and discover individuals with tuberculosis if they cannot be followed up immediately. It is gratifying to note that follow-up of tuberculous patients and contacts has become a routine in nursing service. The plan of arranging a schedule so that a clinician conducts a clinic in a county the same day each month has proven to be very successful. The permanent date soon becomes familiar to the physicians of a county as well as the public, so that requests for appointments are made in advance of the clinic day.

When the clinics were first started, a considerable period of time was required by the nurse beforehand for organization purposes. The service was new and the people had to be educated as to the value of the service; consequently, many persons had to be visited before a sufficient number would promise to attend a clinic for examination. During the past two years the service has become so popular that organization occupies a very small portion of the nurse's time, and the main difficulty now is in limiting the number of people for examination. This became a problem of such importance that finally an organization and appointment sheet had to be devised and all persons invited, or asking to attend a clinic, are now given a definite appointment.

The mortality and morbidity records of tuberculosis in the county are used extensively by the health units in locating contacts for examination. The objective is to have examined every person in the county who has been in contact with tuberculosis. This endeavor serves two purposes: first, it aids in locating many unknown cases of tuberculosis; and second, it serves as a stimulus to better reporting by physicians. If it is demonstrated that use is made of such records in carrying on field activities, the physicians are more willing to cooperate in reporting all cases and deaths from tuberculosis.

Without exception the local health officers of the state are immensely interested in tuberculosis of children. Every health officer is capable of administering the tuberculin test and interpreting the result. The work among children was not included in the field activities during the first two years, due to the fact that the

*Gass, R. S.; and Bishop, E. L.: Tuberculosis Control in Tennessee. J.A.M.A., Sept. 19, 1931.

x-ray facilities were not available. However, when such facilities were acquired the first step taken was to conduct symposiums on the subject, which were attended by every health officer and public health nurse in the state. At these symposiums childhood tuberculosis was discussed in detail by authorities and the methods of diluting tuberculin, its administration and interpretation of results were demonstrated. The health officers themselves were required to do the test, under supervision. Since that time large numbers of children have been tested in every county. So interested have some of the health officers become that they have carried on studies in their counties in an effort to determine the incidence of tuberculous infection among the school children.

In the State Health Department one measure employed in determining the adequacy of the public health nursing service of a given county is the percentage of child contacts examined.

Cooperation of the Medical Profession.—Probably the best index of success of such a program is the attitude of the practising physicians toward the service. From the first there has been exceptional cooperation from the medical profession of the state, but during the past year it is apparent that there is an increasing interest as evidenced by the following facts:

(1) Many more physicians are attending the clinics and taking part in the examinations than did so when the program was first put into operation.

(2) Physicians are referring a larger number of patients to the clinics.

Three years ago the number of patients referred to the clinics by physicians were by far the minority of the clientele. During the past year it has been necessary to restrict the number of patients who are referred to a clinic by physicians, due to the fact that, in many instances, it was found that the entire organization sheet covering a clinic was made up of the names of persons referred by physicians. Rendering consultant service is only one of the objects of the clinics. As another important function of the clinic is case finding, a certain percentage of those attending should be individuals not, at the time, under the care of physicians. The addition of x-ray equipment to the field clinics has played an important role in stimulating both the interest of physicians and patients.

(3) Another evidence of interest is that the majority of patients returning to clinics for re-examination return upon the request of their family physician. The re-examination from time to time serves two purposes: first, changes in the condition of the patients are noted; and second, it assists the physician in maintaining the morale during treatment.

(4) It is an evidence of interest, too, that a number of clinic patients have been benefited by surgery after such measures have been recommended to the family physician by one of the clinicians.

Through the cooperation of the practitioners of medicine, 1,542 clinics have been conducted in the ninety-one rural, or semi-rural, counties of the state, from November, 1927, through June 30, 1931. The average attendance per clinic for that period was 15.7. At these clinics 24,232 examinations were made of 20,220 individuals, and 4,552 diagnosed as having tuberculosis.

DISCUSSION (*Abstract*)

Dr. D. G. Gill, Montgomery, Ala.—Alabama apparently has much the same problem in tuberculosis that Tennessee has, although our death rates are considerably lower, being 49.1 for whites and 152.4 for colored in 1930. Like Tennessee, we have no state-owned or state-operated hospital facilities and our present financial resources will not permit any in the immediate future. We are hoping, however, for some county or district hospitals in the not too distant future.

In the meantime, we are going ahead with fie'd clinics along much the same line as outlined by Dr. Gass. Our problem is a little simpler in that most of our counties have full-time health departments and it is not necessary to arrange for any preliminary or follow-up nursing service. To conserve travel, we are holding clinics for a week at a time and we try to revisit counties every three to six months, depending on their size and problem. This clinic lasting for a week gives the physicians of the county time to visit it and discuss their problems with the clinician in charge. We feel that it is an important feature.

The objectives of our clinics are: (1) educational to both the profession and the public; (2) consultant service to the profession with the hope of earlier diagnosis; (3) to study the problem of tuberculosis and its solution.

The clientele of the clinics is left to the county health officer to arrange, but as far as possible we are insisting on cases being referred by their family physician. Contacts are sought out and as far as possible tuberculin-tested before being brought to the clinic. We believe that this tuberculin-testing acts as a screening procedure and eliminates many who would otherwise occupy the time of the clinic. Re-examinations are made of suspects and of positive cases at the request of the physician in charge, but once a diagnosis is made it is felt that the clinic is better employed with new material. Physicians are urged to accompany their patients and in practically all instances a meeting of the county medical society is arranged to discuss various factors in tuberculosis.

During the first ten months of this year we have examined 3,581 patients, of whom 167 were re-examined. Of this number, 1,146, or 30.5 per cent, were "positive" and 716, or 19.1 per cent, were "suspects." Two thousand six hundred and eight, or 69.5 per cent, of these cases were referred by physicians and more than 50 per cent of the physicians in the counties visited referred patients, while approximately 33 per cent of them visited the clinics with their patients.

These clinics are doing more to bring the profession to a realization of the work of the health departments than any other single activity and at the same time they are stimulating an interest in tuberculosis that will have far-reaching effects.

Dr. Horton Casparis, Nashville, Tenn.—I have had an opportunity to observe the work of the State Health Department of Tennessee and it seems to me because of the nature of tuberculosis, because of its slow onset and failure to make people sick, it is absolutely necessary that there be some official organization for finding tuberculosis if we are going to institute any preventive or control measures. The physicians cannot go out and call in those suspected of having tuberculosis and then charge them.

No matter how much we do, we shall never have enough hospitals and beds to take care of the sick. Prevention is the important thing. The Health Department in Tennessee is placing the control and prevention of tuberculosis on the physician himself.

I hope this is leading to the location of practically all the tuberculosis so that there will be in the Health Department a spot map of tuberculosis. There should be a map for tuberculosis as for smallpox and other communicable diseases. The subsequent finding of new cases would be less difficult.

TUBERCULOUS MENINGITIS IN ADULTS*

By JOHN C. GEORGE, M.D.,†
Oteen, N. C.

A review of the literature reveals a paucity of material on the subject of tuberculous meningitis in adults. This discussion is based on 38 cases of tuberculous meningitis observed in adults in the Veterans' Administration Hospital, Oteen, North Carolina, found among a total admission of 19,132 patients of all types. Of this group the author has examined 28 cases. It is with the hope of adding some helpful observations on the adult type of tuberculous meningitis that a review of this comparatively large group is presented.

While statistics are available for children, I have been unable to find any which referred to the incidence in adults. In my experience the classical description dealing with the symptomatology of children is not applicable to the adult type. Next to the acute epidemic cerebrospinal type, tuberculous meningitis is the most common form and occurs most frequently between the ages of two to fourteen years, occasionally from fifteen to thirty-five, and rarely after forty. The average age of our patients was thirty; the youngest being twenty-three and the oldest forty-two.

Eight per cent of all deaths were due to tuberculous meningitis during a four-year period at the Babies' Hospital, New York City. Among Holt's 197 cases of meningitis in children, 70 per cent were tuberculous as proved by spinal puncture or autopsy. In our hospital the incidence of tuberculous meningitis is one in every 250 patients with active tuberculosis, being more common in males. Bonney states that he has never seen a case of tuberculous meningitis among Jews, Swedes or negroes. Five of our patients were negroes out of approximately 750 treated, giving an incidence among negroes of one in every 150 cases having active tuberculosis.

Tuberculous meningitis is probably always secondary to an active tuberculous process elsewhere, although instances have been reported in which no tuberculous focus has been found by autopsy. The theory of inhalation of bacilli through the nostrils and cribiform plate is not well authenticated. The disease is hematogenous in origin. In infection of the lymphoid type the extension is usually from the middle ear, vertebrae or lymph nodes. Infection through the blood stream can come from any place in the body, the usual sites being the lungs, larynx, bones, genito-urinary tract and intestines.

In our group of 38 cases, the tuberculous diagnosis and complications were as follows: pulmonary tuberculosis, 34; acute miliary tuberculosis, 3; tuberculosis of spine, 3; tuberculosis of foot and knee, 1; tuberculosis of intestines, 3; tuberculosis of larynx, 2; tuberculosis of kidney, 1; tuberculosis of testicle, 1; fistula in ano, 1. Of the patients with extra pulmonary lesions, 4 had no demonstrable pulmonary tuberculosis. It will be seen from these diagnoses that complications in addition to pulmonary tuberculosis are comparatively common in patients developing tuberculous meningitis. It is claimed that in general irritable, highly excitable persons are found to develop this complication more frequently and that it is seen more often after a

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protracted nervous strain or emotional disturbance. This, however, is merely an erroneous interpretation of cause and effect, as the tuberculous infection makes its appearance comparatively long before the general symptoms are well pronounced. The general nervous symptoms are merely a transitory phase toward more severe symptoms and do not always occur. A seasonal influence is claimed, more cases occurring in late winter and spring on account of a lowered resistance of patients at that season and the added factor of acute respiratory infections. This has not been a factor in our patients who are all under regular hospital regime, but we have noted the tendency of the disease to occur in groups of two or three within a short period of time with a comparatively long interval between.

Miliary tuberculosis in children shows a high percentage who develop meningeal complications. Reinhold states that among 96 cases of miliary tuberculosis (chiefly in children) 56 were of the meningitic type. The statistics of Fraenkel's Pathologic Institute in Hamburg show that among 1,119 adults with acute miliary tuberculosis who were autopsied, 63 had tuberculous meningitis. There were 3 instances of miliary tuberculosis in our series.

There is a tendency to explain the occurrence of meningitis by means of anergy or allergy. Suner states that all patients with tuberculous meningitis have previously had tuberculous foci elsewhere. The existence of these foci suggests that the patient had a pre-allergic period and finally an anergic stage, during which the lack of resistance of the organism permitted the propagation of bacteria with meningeal extension.

At post mortem the tubercles are best seen along the central fissure and sylvian fissure, but may be found in other regions as well. The two first mentioned locations are the ones which show evidence of tuberculous deposits most frequently. The cerebellar region is also an important location, and here the presence of fibrinous exudate allows the recognition of the existing irritant. As a rule fibrinous tendrils are found more often at the cerebellum than anywhere else, although adhesive processes may exist elsewhere either laterally or over the frontal lobes. The inner surface of the dura loses its luster in the presence of fairly well marked exudation. Tubercles may also be seen at the base of the brain, but this is a later occurrence as compared with that along the central and sylvian fissures. Fine fibrillar adhesions are often found between the pia and the cortex. Along the blood vessels of the brain, especially the smaller branches, minute tubercles are also seen. The choroid plexus is usually rich in tubercles. The brain itself is edematous, the convolutions flattened and there is distention of the vessels and ventricles. Microscopic examination shows evidence of early inflammation. Both in the pia-arachnoidea and choroid plexus the inflammatory process is localized around the tuberculous deposit, while the intermittent territories may be free of evidence of inflammation.

In acute generalized miliary tuberculosis, dissemination may take place along soft membranes and infiltration into the brain material may occur. However, tuberculosis in the form of an isolated parenchymatous brain disease is rare. Two factors may be responsible for this: first, the comparative paucity of blood vessels; second, the richness in connective tissue, which is not a suitable substratum for deposition and colonization of tubercle bacilli. Biochemical conditions also play a part in keeping the brain comparatively free from tuberculous infection, inasmuch as there is an extensive cholesterin and lecithin content which apparently protects the tissues against tuberculous invasion.

Symptoms associated with tuberculous meningitis vary with the type of lesion, difference in location, extent of involvement of cortex, virulency of organism and degree of hydrocephalus. In most cases there is an indefinite prodromal period in which the patient develops vague complaints and shows a change in his usual disposition. He may show malaise, apathy, loss of appetite, disturbed sleep and constipation. These prodromal symptoms may last from one to two weeks. The condition is often attributed to poor elimination, and a course of cathartics is often given without any relief of symptoms. Sooner or later the patient complains of severe and persistent headache which is not relieved by the usual remedies. This is the most important and most frequent early symptom. Frontal headache was the outstanding complaint of all of our patients, except 3 whose condition developed abruptly with the onset of mental symptoms. Some of the patients stated the headache started at the back of the head and then radiated upward to the forehead. We have not seen remission of the headache in any case, except when relieved by opiates or overshadowed by the mental condition. Nausea and vomiting are present in nearly all the cases and usually appear with the onset of headache. Vomiting is not of characteristic type and occurs

whether or not food has been taken. Hiccough is often present. One of our most recent cases in which death occurred four days after the onset of meningeal symptoms had persistent hiccough for two days. The ratio between temperature and pulse is another cardinal symptom. Although there is always some elevation of temperature, it rarely goes above 101° F., except in the terminal stage when it is often more elevated. Of much diagnostic value is the pulse rate, which usually is diminished. Patients whose pulse rate has always been in keeping with their temperature curve often develop a bradycardia during the acute symptoms. This manifestation has been fairly constant in our group during the irritative stage of the disease. Some patients showed a drop of 30 in pulse rate in twenty-four hours. We have had patients with a temperature of 102° F. and a pulse rate as low as 50. Some patients do not show a drop in pulse rate at any stage nor does the pulse remain low after a drop. As a rule, the pulse rate becomes elevated in keeping with the temperature curve toward termination when there is increasing stupor and varying degrees of delirium of mild muttering type accompanied by carphologia with rambling incoherent speech. At times early stupor overshadows all other symptoms and the patient cannot be aroused. Apparent remissions for a few days are not rare. On several occasions we have sent word to the patient's relatives that he was critically ill, and upon their arrival they found him in apparently such good condition they could not believe our grave prognosis, which was confirmed a week or ten days later.

Neurologic examination is characterized by variability and changeableness of symptoms, there being no definite organic symptom complex. As a rule there is no marked change in deep reflexes. Several patients showed ankle clonus, which was not constant. Babinski sign was demonstrated in only a few cases. Involuntary jerking and twitching of muscles occurred in several patients. There was a striking absence of superficial reflexes. Not all patients had stiffness of neck and pain upon manipulation of head. Kernig's sign was not present as often as might be expected, being demonstrated in about one-half of the instances. There was a tendency for the patient to draw up his legs and lie with his face away from the light.

Eye symptoms such as diplopia and mydriasis accompany all varieties of meningitis. They are often observed in the irritative stage when they are transitory in character. During the late stage ocular paralysis is frequent, but it is characterized by variability from day to day. Our most recent patient showed no eye symptoms until two days before death, when the right pupil became widely dilated and fixed. Choroidal tubercles are not numerous and were demonstrated in only one of our patients. The diagnostic importance of choroidal tubercles is diminished by the fact that as a rule they can be seen only a few days or hours before death. Sauvineau insists on the fugacity and variability of eye symptoms. The transient diplopias and pupillary changes from day to day seen in our group definitely upholds this view. Photophobia is nearly always present in a greater or lesser degree. Terrien and Bourdier have noted the constancy of this symptom in tuberculous meningitis in contrast to its comparative rarity in the epidemic type of cerebrospinal meningitis. The course of the disease is from a few days to several weeks. Only a few of our patients have run a course of more than two weeks after the onset of definite symptoms.

Diagnosis as a rule is not a matter of great difficulty, especially if a spinal fluid examination can be obtained. A patient with a known tuberculous lesion who develops any or all the symptoms noted should be strongly suspected of having tuberculous meningitis, although there are a number of conditions which must be differentiated. Toxic psychosis at times simulates tuberculous meningitis, especially when beginning with mental symptoms. In toxic psychosis the temperature is usually higher, there is no drop in pulse rate and vomiting is not a frequent symptom. Spinal fluid examination will clear up the diagnosis. In encephalitis there is usually a more abrupt onset and the stupor is not so profound. Early vomiting points to tuberculous meningitis, while ocular symptoms are more marked in encephalitis. When meningismus occurs with typhoid fever while the Widal reaction is still negative, the diagnosis is rather difficult. This was our experience with one of our patients. The diagnosis of typhoid fever was finally established by a later culture and Widal test, both of which were positive for typhoid, while the spinal fluid was negative for tubercle bacilli. Abscess and tuberculoma will at times require differentiation. However, these conditions are not so abrupt in onset, the progress of their symptoms is slow and there is a tendency toward localization. The eyegrounds

usually show evidence of papillitis or choked disk. The acute cerebrospinal type of meningitis is more rapid in onset, shows overwhelming toxemia and rash, spinal fluid shows specific organisms, a lesser increase in cells and an absence of tubercle bacilli.

The spinal fluid examination is of great diagnostic value in any case of tuberculous meningitis. The fluid as a rule contains an increased amount of globulin and albumin. The cells vary from 25 to 300 and are chiefly lymphocytic in form. The highest which we encountered was 288. The sugar content is usually diminished, although we had at least one instance in which the sugar content was practically normal. Encephalitis usually shows an increase in sugar content of spinal fluid, while there is a tendency for blood sugar to decrease in tuberculous and purulent forms of meningitis. Wahl made 201 readings on both blood and spinal fluid. Twenty cases of encephalitis showed an average spinal fluid sugar content of 87 mg.; 12 cases of meningitis of all types, 36 mg.; 8 cases of tuberculous meningitis, 27 mg. Tubercle bacilli are not always found in spinal fluid at the first withdrawal, but a second tap one or several days after the first will usually permit demonstration of the organism. To demonstrate the bacilli we add one drop of normal blood serum to about 5 c. c. of spinal fluid and afterward the same amount of alcohol is added. The precipitate formed in this manner is examined for tubercle bacilli. A more recent technic consists of using a 5 per cent carbolic acid solution to replace the alcohol. Reduction of mastic solution is usually more pronounced than is that of the colloidal gold solution, permanganate is well reduced, complement fixation is of no value.

There is a wide variation in literature on the incidence of recovery in tuberculous meningitis. Cramer and Bickel, after an exhaustive study of the literature and a critical review, report 46 cases in which there was recovery. K. Koch has stated that there are about 250 recoveries from tuberculous meningitis on record. In more than two-thirds of these cases, however, the diagnosis was based merely on clinical signs and was not confirmed by demonstration of tubercle bacilli in the spinal fluid. In the other third in which the bacillus was demonstrated the incidence of recovery increased with the age of the patient. Other writers have reported single cases of recovery in apparently authentic cases. In all of our cases there was fatal termination in from four days to three weeks.

Unfortunately there is no known successful therapeutic measure. A German clinic has reported a case of recovery in a boy twelve years of age after ten intraspinous injections of tuberculin. Seeter reports a case of tuberculous meningitis (bacillus demonstrated in spinal fluid) in an infant one and three-fourths years of age in whom intraspinous injections of tuberculin were followed by recovery. This form of treatment is recommended by him in all cases of tuberculous meningitis. Urotropin and iodine in large doses are recommended by some authors for trial. In practically all cases of recovery reported, the chief therapeutic measure was the withdrawal of spinal fluid every two or three days.

SUMMARY

(1) In our group of 38 cases of tuberculous meningitis in adults, the incidence was approximately 1 to 250 among all classes of patients having active tuberculosis and 1 to 150 among negroes.

(2) Active tuberculous processes were demonstrated elsewhere in the body in 100 per cent of the cases.

(3) The cardinal diagnostic symptoms were severe and persistent headache, nausea and vomiting, slow pulse, disproportion between pulse rate and temperature curve, increasing stupor and transitory eye symptoms.

(4) Spinal fluid examination is the measure of greatest diagnostic value.

(5) There is no definite neurological symptom-complex peculiar to tuberculous meningitis.

(6) There was a fatal termination in 100 per cent of our cases. The establishment of a definite diagnosis by clinical symptoms and spinal fluid examination means in our experience a fatal termination.

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SOUTHERN SURGEONS*

RECOLLECTIONS OF MY ASSOCIATION WITH THEM

By WILLIAM J. MAYO, M.D.,
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Sometimes I wonder whether we think enough of the influence that heredity and environment have had upon our spiritual as well as our material enjoyment of professional life. I would dwell for a moment upon this spiritual quality. Born in the North, I feel that no apology is needed for expressing at this time my sense of the debt of gratitude America owes to the Cavaliers of Virginia and the Carolinas, whose descendants furnished the qualities of mind and heart that have so greatly helped to make America what it is today. We are thrilled by the romance and adventure of those historic years which opened a great country, and we appreciate as never before the spiritual qualities of George Washington and the intellectual qualities of Thomas Jefferson which made a democracy possible.

To me the great figures in the unfortunate strife between the South and the North have expressed, those from the South even more than those from the North, the spiritual quality which is America at its best. We think of Abraham Lincoln, but at the same time we think of Robert E. Lee. If we take pride in heroic feats of war, at once comes to mind the name of Stonewall Jackson, the greatest military genius of his time. Jackson's handling of his troops under the most adverse conditions was carried on not only with true fighting spirit, but with inspired knowledge of military tactics and also of modern medicine from the standpoint of the maintenance of physical fitness of soldiers by alternating rest and food under conditions of war. In George Henry Thomas, of Virginia, the Northern army found its finest commander.

From the South, country of heroism and romance, have come many of the great figures in medicine. It has been my good fortune to know personally some of these men and to have had the inspiration of contact with them.

J. Marion Sims is a name with which to conjure. As a first year student in medicine, I had my first glimpse of Sims; and I well remember his stately appearance and his clear incisive discussion of surgical subjects. Through his classical operation for vesicovaginal fistula, he not only introduced American surgery into France but gave American surgery a reputation throughout Europe. With untiring effort and experiment Sims perfected this operation in Montgomery, Alabama. Later he moved to New York City where he was the founder of the Woman's Hospital, the first institution of its kind in America. He was President of the American Medical Association in 1875. His death occurred before the Southern Surgical Association was organized, but the influence of his personality has lived in the aims and ideals of the Association.

As a medical student at the University of Michigan and a junior assistant to that splendid Scottish surgeon, Donald Maclean, I saw and heard another great Southerner, David Yandel, of Louisville, who made a deep impression upon the students, who were to a large extent from the North. On a visit to Maclean, Yandell lectured to us several times upon conditions in surgery abroad. He had just returned from a continental trip, and I remember well his critical comments, couched in beautiful English which gave a gentle touch to his clear-cut opinions on controversial matters. Yandell was a Fellow of the Southern Surgical Association, President of the American Surgical Association in 1889, and President of the American Medical Association in 1871.

I wish to speak of two other distinguished surgeons of the older generation who not only radiated surgical inspiration, but who taught the medical profession to present surgical information with wisdom as well as knowledge and to conduct medical organizations in an orderly and dignified manner, and, I might say in passing, who so instilled love of medicine into their sons that the second generation occupies a most distinguished position in American surgery. A son of each has served as President of the Southern Surgical Association. These men were Dr. W. D. Haggard, Sr., of Nashville, and Dr. Hunter H. McGuire, of Richmond.

Dr. Haggard made splendid scientific contributions, especially to the surgery of obstetrics and the diseases of women, in which specialty he was one of the earliest masters. He was one of the founders of the Southern Surgical Association and its first President. I have greatly enjoyed reading the Annual Address of the President of the Southern Surgical Association of 1893, Dr. Bedford Brown, in which he referred to the outstanding ability of Dr. Haggard and Dr. McGuire and their work in the development of this society.

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Dr. McGuire was the second President of the Southern Surgical Association. He was President of the American Surgical Association in 1886, and President of the American Medical Association in 1893. I remember that he read a paper on prostatic hypertrophy that was a masterpiece. He was the first to perform suprapubic cystostomy for incurable obstructions of the urethra. At the beginning of the war between the states he was a medical student in Philadelphia, and at that time organized 300 students and persuaded them to leave Philadelphia and go to Richmond to the Medical College of Virginia. Before the close of the war he was Chief Surgeon to Jackson's army.

The year after I was graduated from medical school, I went to New York for a postgraduate course at the Polyclinic, and there came in contact with a number of distinguished Southern surgeons who had taken up the practice of their profession in New York. One of them was John A. Wyeth, whose wife was a daughter of J. Marion Sims. Wyeth had been with Forrest, the brilliant Southern cavalry leader, for whom he had great admiration. In his lectures he often referred to Forrest, and later wrote his biography. Wyeth founded the first postgraduate medical school in America, did splendid work in the surgery of the blood vessels, especially the carotids, and was the author of a text-book on surgery which went through several editions.

He also was a Fellow of this Association. In 1901 he became President of the American Medical Association. At the time of his election to the presidency there was present a bumptious little surgeon from one of the Dakotas. A number of us talking with Wyeth saw this man approaching, obviously with the intention of joining us. Knowing his tendencies, we closed our circle. However, he finally forced his way in, and, standing in front of Wyeth, said to him:

"Are you the Wyeth who wrote the text book on surgery?"

"Yes," said Wyeth.

"Well, all I can say is, you had a damned smart assistant to write it for you."

I never met Wyeth in later years that he did not laugh at the incident, and inquire about his critical friend.

George Ben Johnston, of Richmond, one of the founders of the Southern Surgical Association and its President in 1897, had a most distinguished career. He came from one of the great old Virginia families, and was related both to Patrick Henry and to General Joseph E. Johnston. His father was a member of the United States Senate, and his mother was the daughter of an eminent surgeon. He was one of the first to introduce the teachings of Lister into America. In 1904, he was President of the American Surgical Association. He was the ideal type of the Virginia gentleman. Johnston was a genial man, a fine surgeon, and a captivating teacher.

One of the most distinguished surgeons with whom I became well acquainted was William L. Rodman, of Kentucky, and later of Philadelphia. Rodman was, in my opinion, the most brilliant speaker in the American medical profession of his time, a splendid operating surgeon, an outstanding teacher and a man of forward-looking mind. He had been associated with Yandell, and was Professor of Surgery in Louisville before taking the chair of surgery at the Medico-Chirurgical College of Philadelphia.

Following Rodman's career, it is notable that he made a steady climb to the highest positions in surgery in this country. He was a Fellow of the Southern Surgical Association and of the American Surgical Association. In 1898, he was Chairman of the Section on Surgery of the American Medical Association, and in 1915 the President of the Association. During his presidency he founded the National Board of Medical Examiners, an outstanding contribution to medical education. His monograph, "Surgery of the Mammary Gland," was a recognized authority on the subject; and, in 1900, in an oration before the American Surgical Association, he was the first to advocate partial gastrectomy for ulcer of the pylorus and deep ulcer of the duodenum. His paper upon hematemesis and its causes was a classic.

Rodman was not a physically strong man, but he was devoted to his work and gave his life to it. Like Haggard and McGuire, he left a son, John Stewart Rodman, an excellent surgeon and teacher, to carry on his work.

A story about Rodman which I have always enjoyed is in connection with a controversy which occurred over the introduction of a pernicious osteopathic bill. At the hearing before the State Legislature Rodman appeared for the regular medical profession. The attorney for the osteopaths said, repeating it many times throughout his argument:

"The medical profession has built a fence around itself which is horse high, bull strong, and pig tight."

Rodman, when he rose to answer, ignoring everything the man had said except that remark, replied:

"Yes, it is perfectly true that the medical profession has built a fence around itself which is 'horse high, bull strong, and pig tight,' but it is with no idea of excluding those who can enter through its scientific gates, but simply to keep out the jackasses."

The bill was killed.

In the death of Rodman I lost a personal friend for whom I had a deep affection.

The next man I wish to speak of is Joseph Price. Born in Virginia, he was educated in New York and Pennsylvania, and pursued his professional career in Philadelphia. Price was a Fellow of the Southern Surgical Association, its Vice-President in 1893. He was the father of abdominal surgery in America. He did for this country what Lawson Tait did for England. In sarcasm and invective as well as in professional bent he was a match for Tait, and in many other respects they were two of a kind.

As a young man interested in surgery, I read in various medical periodicals papers presented by Price, and his discussions; and I must say that the way his ideas were treated by the leading members of the medical profession was enough to irritate any one. He was distinctly unpopular with the leaders in Philadelphia and New York. Yet it seemed to me that with all the smoke there must be some fire; and as the few abdominal operations I had performed up to that time had carried considerable mortality, I made up my mind that I would go to see him and then go on to New York to the men with whose work I was familiar, having spent some weeks there every year.

It was my first visit to Philadelphia. I went out to the makeshift hospital where Price did his work, a double tenement facing the Reading Railroad, and inquired for him, only to be informed that he was out of town. Each morning I returned and was told the same thing. On the fourth day they said he would return that morning. As I sat in the little bare waiting room, the door opened suddenly with a bang and a man with cropped mustache and close-cut hair showing some gray bounced into the room. Behind him was a man whom I learned to know and love, Lewis S. McMurtry, of Louisville, Kentucky.

And let me digress for the moment to speak of this lovable man. McMurtry was not only an outstanding surgeon, a teacher and a leader in the medical profession, but he was always the friend of the younger men, as I have reason to know. He was a Fellow of the Southern Surgical Association, its President in 1891, and in 1905 was President of the American Medical Association. I have already paid a tribute to him in a brief biography written at the time of his death.

To return to Price, when the door opened so violently and he burst into the room, he stepped over to me and said brusquely, "Who are you? What do you want?" I told him who I was and said that I wanted to see Dr. Price.

"I am Dr. Price. What do you want?"

"I want to see you operate."

"I am sorry," he replied, though he did not look sorry, "but I have more people around here now than I can bother with."

Just here McMurtry, who had been looking at me with sympathy, touched him on the shoulder, and, as Price turned his head, winked at me over his shoulder, and whispered to him.

Price turned back to me and asked: "How long have you been here?"

"Four days."

"Whom have you seen?"

"No one. I have been waiting to see you, but I am going to New York this morning."

"Don't do that. Come in."

Price had no separate quarters for his operations, but made it his habit to operate in the patient's room, on a board laid upon two saw horses, and used only a handful of instruments. He did not employ the Trendelenberg position, which as a matter of fact had not come into general use at that time. He treated the stump after hysterectomy extraperitoneally, using the wire loop. At first he drained all his abdominal operations with a glass tube, emptied frequently with a long-handled syringe. All of his operative work was done with a degree of daring and surgical acumen which I had never before witnessed. What I learned from him enabled me to go home and begin work in abdominal surgery with some satisfaction. I spent a number of weeks with him every year for several years, and while in Philadelphia grew to know Howard A. Kelly, Charles Penrose, John W. Baldy, and many others who were assistants to Price and who became famous in abdominal surgery.

Price continued his methods with little change to the end. And although in a later day his methods seemed crude, yet his results, at least, so far as mortality was concerned, have never been surpassed.

I could tell many stories of Price and the sarcastic force of his repartee. On one occasion the late Dr. A. J. Ochsner and I were in Toronto to attend a medical meeting at which Price was to appear. Price had been used none too well by the New York men, and a controversy was on as to the merit of his work. A surgeon of New

York read a paper on intestinal localization at this meeting and attempted to describe a method of picking up a piece of intestine and determining from the appearance of the one loop its exact position and relationships. At the close the author said that his work was all experimental, and that he really could not tell much of anything about it and doubted that it was of value. Price immediately got up and asked for a standing vote of thanks to the gentleman for presenting the finest piece of original scientific work in surgery that had come out of New York in the last twenty years. Everybody stood up, much impressed, and then some one laughed. Of course, in a moment every one was roaring, and it broke up that session of the meeting.

Dr. Charlie, on his return from a visit to Philadelphia, related to me a story about Price. The so-called Apostoli electrical treatment for the cure of uterine fibromyomas was receiving a great deal of attention at that time and an exponent of the treatment was to give a demonstration to prove its claims before the College of Physicians of Philadelphia. Price was prepared. He appeared in the hall with much paraphernalia, notably a number of glass jars containing surgical specimens, and while the man was talking took careful notes. When the discussion was opened Price arose, gave a detailed history of a large number of the patients the man had cited as cured, and showed the surgical specimen in each case which he had followed up and in which he had operated.

On another occasion at a medical meeting a very distinguished surgeon who sketched beautifully with colored chalk illustrated the modern method of performing hysterectomy. It was well done and the audience was much impressed. Price was called upon to open the discussion. He began:

"This splendid presentation of the so-called modern operation for hysterectomy reminds me of a time when I was a boy down in Virginia. One day I saw a negro leading a horse up and down, blanketed, with its legs bandaged, and I said to the boy:

"What is this animal, a running horse?"
"No, Boss. This horse can't run."
"Is it a trotting horse?"
"No, this horse can't trot."
"Certainly he is not a draught horse."
"No, this horse can't pull."
"What kind of a horse is he, then?"
"Oh, he is just a kind of show horse."

Before closing I wish to pay homage to a tragic figure in American medicine, W. Elias B. Davis, of Birmingham, another founder of this Association. As I have stood in Woodrow Wilson Park in Birmingham and looked at the statue of this brilliant surgeon erected by the Fellows of the Southern Surgical Association, there have gone through my mind memories of the stimulating contacts I had with him in the early days of my career. Full of enthusiasm, a man of vision, with energy beyond his physical strength, his contributions to many surgical problems and his profound researches gave him a lasting position in American medicine. There was hardly a subject during the growing period of surgery that he did not touch with the hand of the master. His work in the surgery of the common bile duct was classical. His unfortunate death as the result of a railway accident, in the prime of life, cut short a valuable career; and we still mourn a man who died too young.

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EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Twenty-Sixth Annual Meeting
Birmingham, Alabama, November 16-18, 1932

THE NOVEMBER MEETING

After a hot Southern summer, when fall winds are beginning to make work and endeavor more pleasurable, comes a brain-stirring interlude, the Southern Medical meeting. Here is the opportunity to learn that something can be done for one's worst case, that possibly one's last infectious disease was over- or under-treated, that a slight change in the technic of an operation or in postoperative care might have saved a patient, that a recent variation in a laboratory method may make the difference between correct diagnosis and failure with a puzzling syndrome.

Birmingham, host of the Association this year, the largest city in Alabama and one of the largest in the South, is a railroad and an industrial center which has shown a remarkable development in this century. Its steel mills, pipe, cement, textile and many other factories have given it an industrial reputation equal to that of the great Northern centers. Starting as a muddy village in a valley toward the end of the Nineteenth Century, known early as the Magic City because of the speed of its growth and transformation, it has now paved practically the entire valley and spread over the surrounding magnificent mountains in every direction. On its winding well graded roads which follow the curves of the hills, residence districts and country clubs as beautiful as any in the world, have appeared. With its intense business development, it has the charm of a Southern city.

The Jefferson County Medical Society of 376 members contains the names of many officers, leaders and charter members of the Southern Medical Association, men of repute in America.

In looking through the preliminary program of the coming meeting, which will be published in full in the next issue, many topics for discussion arrest one's attention. Abdominal surgery in the aged, aseptic anastomosis of the colon, surgery of the sigmoid, treatment of burns, treatment of intestinal obstruction, tumors of the breast, denervation of the ureter, diseases of the pancreas, radical frontal sphenoid and ethmoid operations under local anesthesia, present knowledge of poliomyelitis, nutritional edema, blood dyscrasias with throat manifestations, distribution of malaria in the Southeastern states, metabolism of arthritis, local anesthesia in obstetrics, and a large number of other subjects of current and constant interest are noted.

Meeting with the Association this year, in addition to the regular sections, is the Southern Branch of the Society of Experimental Biology and Medicine, which offers material of value to physicians particularly interested in problems of medical research. The American Society of Tropical Medicine and the National Malaria Committee will likewise meet conjointly. The Southern Branch of the American Public Health Association will hold a meeting immediately before that of the Southern Medical Association, so that its members may readily attend both conventions.

The last year, 1931, was probably economically the year of greatest depression of the country since the organization of the Association. The New Orleans meeting was none the less outstandingly successful and well attended. Looking over one's professional life from student days, those of internship and residency, one must be struck by the fact that those men in medicine who have stimulated and influenced one most have been regular and enthusiastic attendants of medical gatherings. The desire to keep abreast of medical thought and progress is best satisfied by going to meetings and hearing papers and discussions by those of experience, and learning their attitude, rather than by waiting, possibly for months, for the talks to be published in journal or book form.

If medical meetings are deemed necessities by those in authority how much more imperative is it for average mortals in medicine to seek such instruction in the most pleasant and in the quickest manner in which it can be acquired.

The Southern Medical Association's twenty-sixth annual meeting in Birmingham, November 16-18, offers an opportunity for physicians to secure what Osler called a "brain dusting" at a minimal cost and loss of time from practice, by a trip to the most central point in the Southern states. The usual reduction in railway rates will obtain this year, to secure which a certificate that one is attending the meeting should be obtained from the Association office in Birmingham. Good automobile roads likewise enter Birmingham from all directions. Birmingham has a modern air port with passenger ships on regular schedules for the air minded. The ladies as usual are expected, and many plans have been made for their entertainment. No registration fee is charged anyone. All are invited who are members of a county medical society. Plans are complete for a hotel-crowding attendance. Make your reservations now! A list of the committees in charge of the meeting is to be found on page 1107.

CANCER AND BLOOD SUGAR

Attempts to treat cancer are concerned on the one hand, if one omits surgery from the discussion, with the use of substances toxic to cancer cells and less toxic to normal cells, such as x-ray and radium, or the lead injections of Blair Bell; and on the other hand with attempts to deprive the cancerous growth of substances necessary for its nutrition. Opposite weapons of attack upon the enemy are thus in the first case poison, and in the second starvation.

Blood-chemical findings in cancer patients have usually been normal, although an unflagging search has gone on for diagnostic differences which might suggest a point of approach.

There are some characteristic variations from normal tissue in cultures of tumor tissue carried on outside the body. A recently reported difference lies in the reaction to the anticoagulant heparin.[1] Warburg over a number of years has studied tumor metabolism. He has shown that tumors can live anaerobically: that carcinoma tissue transforms glucose completely to lactic acid in the absence of oxygen, which normal tissue does not. *In vitro,* the tumor needs an increased quantity of glucose for its growth, and its growth rate may be varied by increasing or decreasing the glucose supply.[2]

If blood entering and leaving a tumor be examined, according to Cori and Cori, it will be seen to lose glucose and gain lactic acid in approximately equivalent amounts, suggesting that the metabolism *in vivo* and *in vitro* are similar, and that the developing tumor in the animal body also changes glucose to lactic acid.

Woodward and Fry, in 1931, reported that the blood sugar of cancer patients was high in proportion to the degree of malignancy of the growth: that if the number of mitoses in a microscopic section of a tumor was high, that is, if the tumor was fast growing, the blood sugar was likewise high. The greater the blood sugar or glucose, the faster, apparently, the cancer cells were able to reproduce. The cancer patient's sugar tolerance, after the usual test in which he ingests a large quantity of sugar, is said to be high.

Since the widespread use of insulin, the methods of sugar determination upon small quantities of blood have been much studied. There has been considerable work to show that older reagents were affected by substances in the blood other than sugar, and consequently gave too high values for blood sugar.

The Pennsylvania workers,[2] using the Hagedorn-Jensen sugar method, which they believe to be most accurate, report that a fasting blood sugar of 75 to 95 milligrams per 100 cubic centimeters of blood is normal, most normals falling in the lower levels; and that cancer patients on the contrary average 98 to 100 milligrams. The fasting blood sugar of untreated cancer patients particularly is high. The high blood sugar they find to be of no diagnostic but only of prognostic value; for patients with high sugar have a poor prognosis, a fast growing tumor; and those with low sugar respond to most treatments. They conclude that reduction of the blood sugar is likely to benefit the patient.

Their sugar findings should not be difficult to confirm or deny, since cancer patients are all too common and blood sugar determinations are to be obtained in many offices and in most hospitals. The method of analysis for sugar should be inquired into by the physician who orders it.

1. Zakrzewski, Z.: Quoted, Science News. Science, 76:8, Aug. 5, 1932.

2. Woodward, G. E.; and Fry, E. G.: Hyperglycemia of Cancer. Biochem. Jour., 26:889, 1932.

If Woodward and Fry are correct, it might seem that one has only to give the cancer patient enough insulin to starve the tumor and keep its rate of growth at a low ebb to relieve the patient. If blood sugar were the main concern, diabetics should die of cancer more frequently and with greater rapidity than do other persons; and this is not the case. And patients with deficiency of the suprarenal cortex should be the rarest sufferers from cancer. Parfentjev,[3] of Washington University, reports changes in calcium and nitrogen metabolism in normal and cancerous mice. Urinary excretion of calcium and of one fraction of nitrogen were reduced.

An interminable number of attempts to show that cancer is caused by a microorganism have failed. Malignancy is on the increase among all nations of the world. Dietary restrictions to reduce the blood sugar of cancer patients certainly could do no harm and might be worthy of trial.

GLEANINGS FROM RECENT JOURNALS

Nitrogen Elimination in the Absence of the Kidney.—There are many occasions on which the surgeon would like to assist kidney function: for example, in a postoperative patient with anuria; always of course in cases of mercuric chloride poisoning; and in other conditions of reduced kidney function where the patient might survive if he could be tided over a crisis. Bliss, Kastler and Nadler,[1] of Tulane University School of Medicine, report attempts to aid nitrogen elimination in dogs which had been nephrectomized. The edema of the animals, they say, rapidly becomes great. The ascitic fluid is rich in urea, and practically in equilibrium with the concentration of that substance in the blood.

They were able to accomplish the elimination of nitrogenous wastes by the introduction of a solution of balanced salts into the peritoneal cavity and its subsequent withdrawal. They allowed ten minutes for diffusion of waste products into the injected fluid and then withdrew it through a trocar. The washing was repeated from five to twenty times. Relief of nitrogen retention was prompt. The plasma nitrogen fell rapidly. The survival period of the untreated dogs was about three days. With peritoneal lavage of this type some animals lasted from thirteen to sixteen days. An artificial kidney was thus produced, with a possible utility in extreme human crises of kidney injury.

Cause of Gallstones.—Dostal and Andrews,[2] of the University of Chicago, have attempted to show some of the chemical processes in the formation of cholesterol stones in the infected gall-bladder. The bile salts, they say, normally hold cholesterol in solution. If the ratio of salts to cholesterol falls below a certain level, the cholesterol is precipitated. If by various means infection is introduced into a dog's gall-bladder, the salts in the bile are reduced to 25 per cent of their normal value. The cholesterol content at the same time is approximately doubled. Outside the body, no such changes take place from the action of bacteria on bile.

Liver of Pernicious Anemia Patients.—Castle and Sturgis showed that meat digested in a normal stomach can stimulate blood formation in a patient with pernicious anemia; that meat digested in the stomach of a pernicious anemia patient is ineffective. Richter, Ivy and Kim[3] investigated an extract made from the liver of a pernicious anemia patient who had been treated and was in a stage of reticulocyte stimulation, and observed that it stimulated reticulocytosis in three other patients. Extract prepared from the liver of a treated case which had not improved was ineffective. The active principle they believe was stored, like a vitamin, in the liver of the patient who improved.

Maxillary Sinusitis and Suprarenal Cortex.—The announcement of the Coffey-Humber injection treatment of cancer, by which tumor masses were dissolved and liquefied and patients in the last stages of malignancy were restored to health and happiness, was made at an opportune time for attracting the attention of the medical profession. Interest in the endocrine glands and particularly in extracts of the suprarenal cortex was acute, and but for the mention of this substance, it is probable that the accounts would not have attracted a large number of patients to California. Interest in the Coffey-Humber treatment has greatly subsided, but interest in

3. Parfentjev, I. A.: Calcium and Nitrogen Content in Urine of Normal and Cancer Mice. Proc. Soc. Exper. Biol. and Med., 29:1285, June, 1932.
1. Bliss, S.; Kastler, A. O.; and Nadler, S. B.: Peritoneal Lavage. Effective Elimination of Nitrogenous Wastes in the Absence of Kidney Function. Proc. Soc. Exper. Biol. and Med., 29:1078, June, 1932.
2. Dostal, L. E.; and Andrews, E. A.: Chemical Changes in Infected Dogs' Gall-Bladder Bile. Proc. Soc. Exper. Biol. and Med., 29:1100, June, 1932.
3. Richter, O.; Ivy, A. C.; and Kim, M. S.: Action of Human "Pernicious Anemia Liver Extract." Proc. Soc. Exper. Biol. and Med., 29:1093, June, 1932.

cortical extracts, prepared by established methods, has waxed great. The drug is still worth its weight in gold or platinum to produce, but it is being employed in numerous experimental studies.

Bacterial infections, which in general have yielded ungraciously if at all to the many antibacterial and resistance-raising treatments in use, are said to be in some instances favorably influenced by cortical injections. Wenner,[4] of the Department of Otology and Laryngology of Washington University, reports a series of rabbits whose maxillary sinuses had been irrigated periodically to produce sinus infection. After all were heavily infected, half were given suprarenal cortical extracts and half were kept as controls. The treated showed healed sinuses in a week. The controls remained full of pus. It would be most gratifying if these cures could be repeated in animal and human cases.

Southern Medical Association

THE SOUTHERN MEDICAL ASSOCIATION: AN HISTORICAL SKETCH*

The last annual meeting at New Orleans, November 1931, marked the quarter-century point since the organization of the Southern Medical Association. An attendance of sixteen hundred and eighty-nine representative physicians from the fifteen Southern states and the District of Columbia, and the highly practical and scientific programs of the general sessions and the sixteen sections, prove that the medical profession of the South has been united in the upbuilding of an organization that has become the second largest in the United States and one of the most useful in existence.

The Southern Medical Association was founded for scientific purposes and to aid in solving the medical problems peculiar to the South. It has no direct affiliation with the various state medical organizations or the American Medical Association, though membership in a county and state medical society is a prerequisite. It has no legislative functions, and has not been connected in any way with medical legislation in the states and national governments. The Southern Medical Association has made a record of splendid achievement and is the pride of the progressive physicians of the South.

A brief review of its history may be of interest at this time. In the summer of 1906, Dr. G. C. Savage, of Nashville, then President of the Tennessee State Medical Association, suggested that members of the Tri-State Medical Society of Georgia, Alabama and Tennessee invite the physicians of Florida, Mississippi and Louisiana to join with them to form an organization to become the Southeastern Branch of the American Medical Association, it having been previously suggested that the National Association should have regional meetings. Dr. Savage invited the presidents of the six Southeastern states to meet him at Chattanooga at the annual gathering of the Tri-State Medical Society in Chattanooga in October, 1906. The Tri-State Medical Society then went out of existence as such and the Southern Medical Association was organized. The American Medical Association abandoned the idea of having regional societies and the Southern Medical Association has functioned since as an independent organization, not affiliated with, or in conflict with, any other medical body.

Dr. H. H. Martin, of Savannah, the President of the Georgia State Medical Association, was elected first President of the Southern Medical Association; and he assumed the duties of organizing the physicians of the component Associations of Georgia, Alabama, Florida, Mississippi, Louisiana and Tennessee. A committee consisting of Dr. H. H. Martin, Dr. W. W. Crawford, of Hattiesburg, Mississippi, and Dr. Jere L. Crook, of Jackson, Tennessee, was appointed to write the constitution and by-laws. They sat up all night in a room in the old Reid House in Chattanooga; and as a result of their concentrated efforts they framed a constitution that has stood well the test of time. It was rewritten by a special committee appointed by the Council and presented at the Atlanta meeting in 1926 and adopted at the Memphis meeting in 1927 one year later, no fundamental changes having been made from the original.

Dr. Raymond Wallace, of Chattanooga, was chosen Secretary-Treasurer at the organization meeting and served for one year. He was succeeded by Dr. Oscar Dowling, of Shreveport, Louisiana, who established and edited the *Journal of the Southern Medical Association.* The *Journal* was not a success financially. In 1909, Dr. Dowling resigned as Secretary-Treasurer and the Association decided to abandon the publication of its *Journal* and select as its official organ a medical periodical that was already established. The contract was awarded to the *Gulf States Journal of Medicine and Surgery* of Mobile, and its editor, Dr. Seale Harris, was elected Secretary-Treasurer.

In 1910, the *Southern Medical Journal,* of Nashville, an independent publication of which Dr. J. A. Witherspoon was Editor-in-Chief and Dr. W. A. Bryan and Dr. W. D. Haggard were joint Managing Editors, was purchased by Dr. Seale Harris, who consolidated it with the *Gulf States Journal of Medicine and Surgery,* under the name of the *Southern Medical Journal,* Journal of the Southern Medical Association.

In 1911, at the Hattiesburg meeting a contract was entered into between the Southern Medical Association and the stockholders of the *Southern Medical Journal,* providing that the *Journal* should become the property of the Association at the end of ten years on the annual payment for ten years of an amount equivalent to the average annual net earnings of the *Journal* for the three years previous to and including 1921. The Southern Medical Association paid the stockholders in full in only seven years, thus acquiring an established journal paid for out of its earnings. The Southern Medical Association has been more than self-sustaining and has some surplus that has enabled it to carry on through the present financial depression.

Dr. Seale Harris served as Secretary-Treasurer and Editor-in-Chief for eleven years. Dr. H. A. Moody, of

4. Wenner, W. F.: Effect of Adrenal Cortex Extract on Maxillary Sinusitis in the Rabbit. Proc. Soc. Exper. Biol. and Med., 29:1131, June, 1932.

*Editor's Note: The JOURNAL is indebted to Dr. Seale Harris, of Birmingham, Alabama, for much of the data from which this historical sketch has been prepared.

Mobile, Managing Editor of the *Gulf States Journal of Medicine and Surgery*, continued in that capacity with the *Southern Medical Journal* until his death in 1916, when Dr. M. Y. Dabney, of Birmingham, the present Editor, was made Associate Editor. The latter later became Editor-in-Chief on the resignation of Dr. Harris in 1921. In 1929, Mrs. Eugenia B. Dabney was made Assistant Editor, in which capacity she continues to serve.

In 1921, Mr. C. P. Loranz, who had been Assistant Secretary-Treasurer since 1912, was elected Secretary, Treasurer and Business Manager, to carry the title of Secretary-Manager. He was re-elected for a period of five years at New Orleans last November.

PRESIDENTS

While the Council of the Southern Medical Association acts as a nominating committee, nominations may also be made from the floor, and the election of the president and other officers is by the ballot of the attending members at the last general session. The Council has held that the qualifications for the presidency of the Southern Medical Association shall be as follows: first, ability, attainments and an outstanding reputation as a physician; second, service and loyalty to the Association; and third, geographical location and type of practice. It was thought that it would add to the prestige of the Association in the various states to select an outstanding man from each state as president. And since the Association is divided into sections representing the specialties, it has been considered desirable also to permit representation to some extent to the various specialties. The following presidents from fourteen states and the District of Columbia have served with honor and distinction:

Alabama: *Dr. B. L. Wyman, neurologist, Birmingham, 1908; Dr. Seale Harris, gastroenterologist, Birmingham, 1922.

Arkansas: Dr. William R. Bathurst, dermatologist, Little Rock, 1928.

District of Columbia: Dr. Hugh S. Cumming, public health, Washington, 1930.

Florida: *Dr. James F. Jackson, surgeon, Miami, 1912.

Georgia: *Dr. H. H. Martin, eye, ear, nose and throat, Savannah, 1907; Dr. Stewart R. Roberts, internist, Atlanta, 1925.

Louisiana: *Dr. Isadore Dyer, dermatologist, New Orleans, 1911; *Dr. Oscar Dowling, public health, New Orleans, 1915; Dr. C. C. Bass, internist and pathologist, New Orleans, 1926.

Maryland: Dr. Lewellys F. Barker, internist, Baltimore, 1918, 1919.

Mississippi: Dr. W. W. Crawford, surgeon, Hattiesburg, 1910; Dr. W. S. Leathers, public health, formerly of Jackson and now of Nashville, Tennessee, 1923; Dr. Felix J. Underwood, public health, Jackson, 1931.

North Carolina: *Dr. Charles L. Minor, internist, Asheville, 1924.

Oklahoma: Dr. L. J. Moorman, internist, Oklahoma City, 1932.

South Carolina: Dr. Robert Wilson, internist, Charleston, 1916.

Tennessee: *Dr. G. C. Savage, ophthalmologist, Nashville, 1909; *Dr. Frank A. Jones, internist, Memphis, 1913; Dr. Duncan Eve, Sr., surgeon, Nashville, 1917; Dr. Jere L. Crook, surgeon, Jackson, 1921.

Texas: Dr. E. H. Cary, eye, ear, nose and throat, Dallas, 1920.

Virginia: Dr. Stuart McGuire, surgeon, Richmond, 1914; Dr. J. Shelton Horsley, surgeon, Richmond, 1927.

West Virginia: Dr. T. W. Moore, eye, ear, nose and throat, Huntington, 1929.

BOARD OF TRUSTEES

In the Board of Trustees, chosen always from the ex-presidents, is vested the control of the properties of the Association, but its actions must be approved by the Council and the Association. The Trustees are elected for a term of two years and may be twice re-elected, may serve a maximum of six years. The following have served as Trustees:

Alabama: *Dr. B. L. Wyman, Birmingham, 1912; Dr. Seale Harris, Birmingham, 1923.

Arkansas: Dr. William R. Bathurst, Little Rock, 1929.

District of Columbia: Dr. Hugh S. Cumming, Washington, 1931.

Florida: *Dr. James F. Jackson, Miami, 1913.

Georgia: *Dr. H. H. Martin, Savannah, 1912; Dr. Stewart R. Roberts, Atlanta, 1926.

Louisiana: *Dr. Isadore Dyer, New Orleans, 1912; *Dr. Oscar Dowling, New Orleans, 1916; Dr. C. C. Bass, New Orleans, 1927.

Maryland: Dr. Lewellys F. Barker, Baltimore, 1920.

Mississippi: Dr. W. W. Crawford, Hattiesburg, 1912; Dr. W. S. Leathers, formerly of Jackson and now of Nashville, Tennessee, 1924; Dr. Felix J. Underwood, Jackson, 1932.

North Carolina: *Dr. Charles L. Minor, Asheville, 1925.

South Carolina: Dr. Robert Wilson, Charleston, 1917.

Tennessee: *Dr. G. C. Savage, Nashville, 1912; Dr. Duncan Eve, Sr., Nashville, 1918; Dr. Jere L. Crook, Jackson, 1922.

Texas: Dr. E. H. Cary, Dallas, 1921.

Virginia: Dr. Stuart McGuire, Richmond, 1915; Dr. J. Shelton Horsley, Richmond, 1928.

West Virginia: Dr. T. W. Moore, Huntington, 1930.

THE COUNCIL

The Council of the Southern Medical Association, composed of one Councilor from each state, has been made up of physicians who rank high in their state medical organizations. The Council is the executive body of the Association, dealing with policies that affect its welfare and that of its members. All resolutions must be considered by the Council before being presented to the Association, and all acts of the Council must be ratified or rejected by the Association at the last general session of the annual meetings. The Council names the meeting places and acts as a nominating committee for all general offices in the Association. The Council through its chairman makes a report to the Association at each annual meeting setting forth all its official acts. The Councilors are appointed by the President for a term of three years and may be reappointed for another term. They may serve a maximum of six years. An equal number of Councilor terms expire each year. The following Councilors have served with distinction from various states:

Alabama: Dr. D. F. Tally, Birmingham, 1907; *Dr. B. L. Wyman, Birmingham, 1909; Dr. J. N. Baker, Montgomery, 1913; Dr. A. W. Ralls, Gadsden, 1920; *Dr. S. W. Welch, Montgomery, 1926; Dr. W. W. Harper, Selma, 1928; Dr. Toulmin Gaines, Mobile, 1932.

Arkansas: Dr. Morgan Smith, Little Rock, 1912; *Dr. C. Travis Drennen, Hot Springs, 1913; *Dr. C. P. Meriwether, Little Rock, 1914; Dr. William R. Bathurst, Little Rock, 1917; Dr. W. T. Wootton, Hot Springs, 1926; Dr. Morgan Smith, Little Rock, 1929.

District of Columbia: Dr. A. R. Shands, Washington, 1912; Dr. Cary T. Grayson, Washington, 1917; Dr. J. Russell Verbrycke, Jr., Washington, 1923; Dr. William Gerry Morgan, Washington, 1929.

Florida: *Dr. John Mac Diarmid, Deland, 1907; Dr. J. M. Jackson, Miami, 1911; *Dr. J. Y. Porter, Key West, 1912; Dr. R. H. McGinnis, Jacksonville, 1914; Dr. H. Marshall Taylor, Jacksonville, 1924; Dr. Edward Jelks, Jacksonville, 1930.

Georgia: Dr. Michael Hoke, Atlanta, 1907; *Dr. H. H. Martin, Savannah, 1910; Dr. W. P. Harbin, Rome, 1925; Dr. Frank K. Boland, Atlanta, 1931.

Kentucky: *Dr. L. S. McMurtry, Louisville, 1913; *Dr. J. A. Stucky, Lexington, 1915; Dr. Stuart Graves, Louisville, 1927; Dr. John H. Blackburn, Bowling Green, 1928.

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*Deceased.

Louisiana: Dr. E. D. Martin, New Orleans, 1907; Dr. W. W. Butterworth, New Orleans, 1908; *Dr. Oscar Dowling, New Orleans, 1912; Dr. Louis Abramson, Shreveport, 1914; Dr. J. E. Knighton, Shreveport, 1922; Dr. Homer Dupuy, New Orleans, 1928.

Maryland: Dr. W. S. Thayer, Baltimore, 1912; *Dr. Hiram Woods, Baltimore, 1922; Dr. Sydney R. Miller, Baltimore, 1925; Dr. Edward A. Looper, Baltimore, 1931.

Mississippi: Dr. W. W. Crawford, Hattiesburg, 1907; Dr. W. S. Leathers, University, 1910; Dr. D. W. Jones, Brookhaven, 1911; Dr. F. J. Underwood, Jackson, 1922; Dr. Inman W. Cooper, Meridian, 1928.

Missouri: Dr. George Dock, St. Louis, 1916; Dr. O. H. McCandless, Kansas City, 1922; Dr. McKim Marriott, St. Louis, 1925; Dr. Walter Baumgarten, St. Louis, 1931.

North Carolina: Dr. Joseph Graham, Durham, 1912; Dr. Joseph B. Greene, Asheville, 1916; Dr. F. Webb Griffith, Asheville, 1925; Dr. Paul H. Ringer, Asheville, 1931.

Oklahoma: Dr. Ira W. Robertson, Dustin, 1913; Dr. Millington Smith, Oklahoma City, 1914; Dr. L. J. Moorman, Oklahoma City, 1922; Dr. Lea A. Riely, Oklahoma City, 1928.

South Carolina: Dr. Robert Wilson, Jr., Charleston, 1912; Dr. J. W. Jervey, Greenville, 1915; Dr. William Weston, Columbia, 1926; Dr. F. H. McLeod, Florence, 1930.

Tennessee: *Dr. G. C. Savage, Nashville, 1907; Dr. G. R. West, Chattanooga, 1909; Dr. A. B. Cooke, Nashville, 1910; Dr. J. A. Crisler, Memphis, 1913; Dr. William Litterer, Nashville, 1920; Dr. Edward T. Newell, Chattanooga, 1926; Dr. Eugene Rosamond, Memphis, 1932.

Texas: Dr. Edward H. Cary, Dallas, 1912; Dr. Oscar M. Marchman, Dallas, 1919; Dr. H. Leslie Moore, Dallas, 1924; Dr. Elbert Dunlap, Dallas, 1930.

Virginia: Dr. Stuart McGuire, Richmond, 1912; Dr. J. Shelton Horsley, Richmond, 1913; *Dr. Ennion G. Williams, Richmond, 1915; Dr. Hugh H. Trout, Roanoke, 1924; Dr. Lawrence T. Royster, University, 1927; Dr. Alfred L. Gray, Richmond, 1930.

West Virginia: Dr. G. C. Rodgers, Elkins, 1912; Dr. T. W. Moore, Huntington, 1919; Dr. W. E. Vest, Huntington, 1926; Dr. James R. Bloss, Huntington, 1932.

The following have served as Chairman of the Council:

*Dr. G. C. Savage, Nashville, Tenn., 1907-1908; Dr. W. W. Crawford, Hattiesburg, Miss., 1909; *Dr. H. H. Martin, Savannah, Ga., 1910-1924; Dr. Wm. R. Bathurst, Little Rock, Ark., 1925; Dr. H. Leslie Moore, Dallas, Tex., 1926; Dr. J. E. Knighton, Shreveport, La., 1927; Dr. H. Marshall Taylor, Jacksonville, Fla., 1928-1929; Dr. Walter E. Vest, Huntington, West Va., 1930-1931; and Dr. Homer Dupuy, New Orleans, La., 1932.

THE SCIENTIFIC SECTIONS

When organized the scientific work of the Association was carried on in three sections, namely, Medicine; Surgery; and Ophthalmology and Otolaryngology. The Section on Public Health was added in 1912, and the Section on Railway Surgery (Southern Association of Railway Surgeons) in 1913. Since that time the following sections have been added: Section on Pediatrics, Section on Gastroenterology, Section on Pathology, Section on Neurology and Psychiatry, Section on Radiology, Section on Dermatology and Syphilology, Section on Bone and Joint Surgery, Section on Gynecology, Section on Obstetrics, Section on Urology and Section on Medical Education.

The following physicians have been Chairmen of the various sections since they were established:

Section on Medicine: *Dr. Thomas D. Coleman, Augusta, Georgia, 1907; Dr. Seale Harris, Mobile, Alabama, 1908; *Dr. John A. Witherspoon, Nashville, Tennessee, 1909; Dr. William Litterer, Nashville, Tennessee, 1910; Dr. William Krauss, Memphis, Tennessee, 1911; Dr. C. C. Bass, New Orleans, Louisiana, 1912; Dr. G. E. Henson, Jacksonville, Florida, 1913; Dr. Robert Wilson, Jr., Charleston, South Carolina, 1914; Dr. William H. Deaderick, Hot Springs, Arkansas, 1915; Dr. K. H. Beall, Fort Worth, Texas, 1916; Dr. J. S. McLester, Birmingham, Alabama, 1917-18; Dr. Randolph Lyons, New Orleans, Louisiana, 1919; Dr. J. E. Paullin, Atlanta, Georgia, 1920; *Dr. Bryce W. Fontaine, Memphis, Tennessee, 1921; Dr. M. L. Graves, Galveston, Texas, 1922; Dr. Allen Eustis, New Orleans, Louisiana, 1923; Dr. W. T. Wootton, Hot Springs, Arkansas, 1924; Dr. C. M. Grigsby, Dallas, Texas, 1925; Dr. Sydney R. Miller, Baltimore, Maryland, 1926; Dr. Paul H. Ringer, Asheville, North Carolina, 1927; Dr. J. B. McElroy, Memphis, Tennessee, 1928; Dr. Lee Rice, San Antonio, Texas, 1929; Dr. C. W. Dowden, Louisville, Kentucky, 1930; Dr. W. R. Houston, Augusta, Georgia, 1931; and Dr. C. Sidney Burwell, Nashville, Tennessee, 1932.

Section on Surgery: *Dr. F. W. Parham, New Orleans, Louisiana, 1907; *Dr. W. S. Westmoreland, Atlanta, Georgia, 1908; Dr. F. G. Dubose, Selma, Alabama, 1909; Dr. E. D. Martin, New Orleans, Louisiana, 1910; Dr. Duncan Eve, Nashville, Tennessee, 1911; *Dr. H. T. Inge, Mobile, Alabama, 1912; Dr. W. A. Bryan, Nashville, Tennessee, 1913; Dr. P. C. Perry, Jacksonville, Florida, 1914; Dr. Isidore Cohn, New Orleans, Louisiana, 1915; Dr. J. H. Blackburn, Bowling Green, Kentucky, 1916; Dr. F. Webb Griffith, Asheville, North Carolina, 1917; Dr. Jere L. Crook, Jackson, Tennessee, 1919; Dr. Lucian H. Landry, New Orleans, Louisiana, 1920; Dr. John R. Caulk, St. Louis, Missouri, 1921; Dr. Hugh H. Trout, Roanoke, Virginia, 1922; Dr. Irvin Abell, Louisville, Kentucky, 1923; Dr. J. Shelton Horsley, Richmond, Virginia, 1924; *Dr. James E. Thompson, Galveston, Texas, 1925; Dr. Joseph Colt Bloodgood, Baltimore, Maryland, 1926; Dr. Frank K. Boland, Atlanta, Georgia, 1927; Dr. Evarts A. Graham, St. Louis, Missouri, 1928; Dr. Barney Brooks, Nashville, Tennessee, 1929; Dr. Charles A. Vance, Lexington, Kentucky, 1930; Dr. Albert O. Singleton, Galveston, Texas, 1931; and Dr. J. M. T. Finney, Baltimore, Maryland, 1932.

Section on Ophthalmology and Otolaryngology: *Dr. L. G. Woodson, Birmingham, Alabama, 1907; Dr. J. T. Heron, Jackson, Tennessee, 1908; Dr. A. W. Stirling, Atlanta, Georgia, 1909; Dr. E. C. Ellett, Memphis, Tennessee, 1910; Dr. M. M. Cullom, Nashville, Tennessee, 1911; *Dr. M. Feingold, New Orleans, Louisiana, 1912; Dr. U. S. Bird, Tampa, Florida, 1913; Dr. Homer Dupuy, New Orleans, Louisiana, 1914; Dr. Joseph B. Greene, Asheville, North Carolina, 1915; Dr. J. W. Jervey, Greenville, South Carolina, 1916; Dr. T. W. Moore, Huntington, West Virginia, 1917; Dr. E. H. Cary, Dallas, Texas, 1919; *Dr. J. A. Stucky, Lexington, Kentucky, 1920; *Dr. W. T. Patton, New Orleans, Louisiana, 1921; *Dr. H. H. Briggs, Asheville, North Carolina, 1922; Dr. John H. Foster, Houston, Texas, 1923; Dr. John J. Shea, Memphis, Tennessee, 1924; Dr. H. Marshall Taylor, Jacksonville, Florida, 1925; *Dr. R. C. Lynch, New Orleans, Louisiana, 1926; Dr. Clifton M. Miller, Richmond, Virginia, 1927; Dr. Edward A. Looper, Baltimore, Maryland, 1928; Dr. William Thornwall Davis, Washington, D. C., 1929; Dr. Frederick E. Hasty, Nashville, Tennessee, 1930; Dr. Fletcher D. Woodward, University, Virginia, 1931; and Dr. W. R. Buffington, New Orleans, Louisiana, 1932.

Section on Public Health: *Dr. Oscar Dowling, New Orleans, Louisiana, 1912; *Dr. J. Y. Porter, Jacksonville, Florida, 1913; *Dr. R. M. Cunningham, Birmingham, Alabama, 1914; Dr. Allen W. Freeman, Washington, D. C., 1915; Dr. W. S. Leathers, University, Mississippi, 1916; Dr. A. T. McCormack, Bowling Green, Kentucky, 1917; Dr. L. B. McBrayer, Sanatorium, North Carolina, 1919; Dr. E. A. Hines, Seneca, South Carolina, 1920; *Dr. S. W. Welch, Montgomery, Alabama, 1921; *Dr. Ennion G. Williams, Richmond, Virginia, 1922; Dr. Henry Boswell, Sanatorium, Mississippi, 1923; Dr. James A. Hayne, Columbia, South Carolina, 1924; Dr. W. G. Smillie, Andalusia, Alabama, 1925; Dr. Roy K. Flannagan, Richmond, Virginia, 1926; Dr. T. F. Abercrombie, Atlanta, Georgia, 1927; Dr. B. L. Arms, Jacksonville, Florida, 1928; Dr. E. L. Bishop, Nashville, Tennessee, 1929; Dr. P. E. Blackerby, Louisville, Kentucky, 1930; Dr. J. N. Baker, Montgomery, Alabama, 1931; and Dr. J. D. Applewhite, Macon, Georgia, 1932.

Section on Railway Surgery: Dr. Duncan Eve, Nashville, Tennessee, 1914; Dr. Thomas H. Hancock, Atlanta, Georgia, 1915; Dr. Southgate Leigh, Norfolk, Virginia, 1916; *Dr. Joseph M. Burke, Petersburg, Virginia, 1917-18; Dr. I. W. Cooper, Meridian, Mississippi, 1919; Dr. H. A. Royster, Raleigh, North Carolina, 1920; *Dr. D. Z. Dunott, Baltimore, Maryland, 1921; Dr. Lucius E. Burch, Nashville, Tennessee, 1922; Dr. W. W. Harper, Selma, Alabama, 1923; *Dr. S. S. Gale, Roanoke, Virginia, 1924; Dr. Edward J. Newell, Chattanooga, Tennessee, 1925; Dr. E. Denegre Martin, New Orleans, Louisiana, 1926; Dr. J. R. Garner, Atlanta, Georgia, 1927; Dr. Archibald E. Chase, Texarkana, Arkansas, 1928; Dr. Frank H. Walke, Shreveport, Louisiana, 1929; Dr. H. M. Michel, Augusta, Georgia, 1930; Dr. Joseph D. Collins, Norfolk, Virginia, 1931; and Dr. D. Y. Roberts, Louisville, Kentucky, 1932.

*Deceased.

Section on Pediatrics: Dr. William Weston, Columbia, South Carolina, 1917-18; Dr. L. T. Royster, Norfolk, Virginia, 1919; *Dr. J. D. Love, Jacksonville, Florida, 1920; Dr. William A. Mulherin, Augusta, Georgia, 1921; *Dr. J. Ross Snyder, Birmingham, Alabama, 1922; Dr. W. McKim Marriott, St. Louis, Missouri, 1923; Dr. Philip F. Barbour, Louisville, Kentucky, 1924; Dr. L. R. DeBuys, New Orleans, Louisiana, 1925; Dr. Alfred A. Walker, Birmingham, Alabama, 1926; Dr. Robert A. Strong, Pass Christian, Mississippi, 1927; Dr. Edward Clay Mitchell, Memphis, Tennessee, 1928; Dr. Eugene Rosamond, Memphis, Tennessee, 1929; Dr. H. Leslie Moore, Dallas, Texas, 1930; Dr. D. Lesesne Smith, Spartanburg, South Carolina, 1931; and Dr. Horton Casparis, Nashville, Tennessee, 1932.

Section on Gastroenterology: Dr. J. C. Johnson, Atlanta, Georgia, 1917-19; Dr. Sidney K. Simon, New Orleans, Louisiana, 1920; *Dr. George M. Niles, Atlanta, Georgia, 1921; Dr. Marvin H. Smith, Jacksonville, Florida, 1922; Dr. Julius Friedenwald, Baltimore, Maryland, 1923; Dr. J. E. Knighton, Shreveport, Louisiana, 1924; Dr. G. C. Mizell, Atlanta, Georgia, 1925; Dr. William Gerry Morgan, Washington, D. C., 1926; Dr. Seale Harris, Birmingham, Alabama, 1927; Dr. John B. Fitts, Atlanta, Georgia, 1928; Dr. J. Russell Verbrycke, Jr., Washington, D. C., 1929; Dr. G. W. F. Rembert, Jackson, Mississippi, 1930; *Dr. Charles G. Lucas, Louisville, Kentucky, 1931; and Dr. Elmer B. Freeman, Baltimore, Maryland, 1932.

Section on Pathology: *Dr. A. G. Kelley, Atlanta, Georgia, 1923; Dr. Stuart Graves, Louisville, Kentucky, 1924; Dr. Kenneth M. Lynch, Dallas, Texas, 1925; Dr. Charles W. Duval, New Orleans, Louisiana, 1926; Dr. John A. Lanford, New Orleans, Louisiana, 1927; Dr. George B. Adams, Emory University, Georgia, 1928; Dr. George S. Graham, Birmingham, Alabama, 1929; Dr. Ernest W. Goodpasture, Nashville, Tennessee, 1930; Dr. Foster M. Johns, New Orleans, Louisiana, 1931; and Dr. M. Pinson Neal, Columbia, Missouri, 1932.

Section on Neurology and Psychiatry: Dr. E. Bates Block, Atlanta, Georgia, 1922; *Dr. W. G. Somerville, Memphis, Tennessee, 1923; Dr. Beverley R. Tucker, Richmond, Virginia, 1924; Dr. M. A. Bliss, St. Louis, Missouri, 1925; Dr. Ross McC. Chapman, Towson, Maryland, 1926; *Dr. B. L. Wyman, Birmingham, Alabama, 1927; Dr. W. E. Gardner, Louisville, Kentucky, 1928; Dr. Lewis M. Gaines, Atlanta, Georgia, 1929; Dr. R. Finley Gayle, Jr., Richmond, Virginia, 1930; Dr. Charles S. Holbrook, New Orleans, Louisiana, 1931; and Dr. Carrol C. Turner, Memphis, Tennessee, 1932.

Section on Radiology: Dr. Robert H. Lafferty, Charlotte, North Carolina, 1920; Dr. O. H. McCandless, Kansas City, Missouri, 1921; Dr. Thomas A. Groover, Washington, D. C., 1922; Dr. D. Y. Keith, Louisville, Kentucky, 1923; Dr. W. R. Bethea, Memphis, Tennessee, 1924; Dr. H. E. Ashbury, Baltimore, Maryland, 1925; Dr. Fred M. Hodges, Richmond, Virginia, 1926; Dr. Sherwood Moore, St. Louis, Missouri, 1927; Dr. E. C. Samuel, New Orleans, Louisiana, 1928; Dr. J. M. Martin, Dallas, Texas, 1929; Dr. J. W. Pierson, Baltimore, Maryland, 1930; Dr. R. T. Wilson, Temple, Texas, 1931; and Dr. J. C. Dickinson, Tampa, Florida, 1932.

Section on Dermatology and Syphilology: *Dr. Marcus Haase, Memphis, Tennessee, 1922; *Dr. J. B. Shelmire, Dallas, Texas, 1923; Dr. Everett S. Lain, Oklahoma City, Oklahoma, 1924; Dr. I. L. McGlasson, San Antonio, Texas, 1925; *Dr. J. M. King, Nashville, Tennessee, 1926; Dr. J. Lee Kirby-Smith, Jacksonville, Florida, 1927; Dr. Earl D. Crutchfield, San Antonio, Texas, 1928; Dr. F. J. Eichenlaub, Washington, D. C., 1929; Dr. J. C. Michael, Houston, Texas, 1930; Dr. C. Brooks Willmott, Louisville, Kentucky, 1931; and Dr. Emmett R. Hall, Memphis, Tennessee, 1932.

Section on Bone and Joint Surgery: *Dr. Wm. S. Baer, Baltimore, Maryland, 1920; Dr. Edward S. Hatch, New Orleans, Louisiana, 1921; Dr. W. Barnett Owen, Louisville, Kentucky, 1922; Dr. Willis C. Campbell, Memphis, Tennessee, 1923; Dr. Fred G. Hodgson, Atlanta, Georgia, 1924; Dr. Frank Dickson, Kansas City, Missouri, 1925; Dr. E. Laurence Scott, Birmingham, Alabama, 1926; Dr. R. Wallace Billington, Nashville, Tennessee, 1927; Dr. W. B. Carroll, Dallas, Texas, 1928; Dr. J. S. Speed, Memphis, Tennessee, 1929; Dr. Geo. E. Bennett, Baltimore, Maryland, 1930; Dr. Oscar L. Miller, Charlotte, North Carolina, 1931; and Dr. Allen F. Voshell, Baltimore, Maryland, 1932.

Section on Gynecology: Dr. Wm. T. Black, Memphis, Tennessee, 1928; Dr. Guy L. Hunner, Baltimore, Maryland, 1929; Dr. W. R. Cooke, Galveston, Texas, 1930; Dr. Thomas Benton Sellers, New Orleans, Louisiana, 1931; and Dr. Lawrence R. Wharton, Baltimore, Maryland, 1932.

Section on Obstetrics: *Dr. George C. Mosher, Kansas City, Missouri, 1921; Dr. Calvin R. Hannah, Dallas, Texas, 1922; *Dr. John T. Altman, Nashville, Tennessee, 1923; Dr. Edward Speidel, Louisville, Kentucky, 1924; Dr. J. R. Garber, Birmingham, Alabama, 1925; Dr. C. Jeff Miller, New Orleans, Louisiana, 1926; Dr. M. Pierce Rucker, Richmond, Virginia, 1927; Dr. William T. McConnell, Louisville, Kentucky, 1928; Dr. James R. McCord, Atlanta, Georgia, 1929; Dr. J. L. Andrews, Memphis, Tennessee, 1930; Dr. Otto H. Schwarz, St. Louis, Missouri, 1931; and Dr. W. Bush Anderson, Nashville, Tennessee, 1932.

Section on Urology: *Dr. John T. Geraghty, Baltimore, Maryland, 1919; Dr. A. J. Crowell, Charlotte, North Carolina, 1921; Dr. E. G. Ballenger, Atlanta, Georgia, 1922; Dr. H. W. E. Walther, New Orleans, Louisiana, 1923; Dr. A. I. Folsom, Dallas, Texas, 1924; Dr. George R. Livermore, Memphis, Tennessee, 1925; Dr. W. J. Wallace, Oklahoma City, Oklahoma, 1926; Dr. Perry Bromberg, Nashville, Tennessee, 1927; Dr. Bransford Lewis, St. Louis, Missouri, 1928; Dr. Raymond Thompson, Charlotte, North Carolina, 1929; Dr. W. L. Grantham, Asheville, North Carolina, 1930; Dr. Owsley Grant, Louisville, Kentucky, 1931; and Dr. Russell A. Hennessey, Memphis, Tennessee, 1932.

Section on Medical Education: Dr. Robert Wilson, Jr., Charleston, South Carolina, 1917; Dr. Stewart R. Roberts, Atlanta, Georgia, 1919; Dr. G. Canby Robinson, Nashville, Tennessee, 1920; Dr. Douglas VanderHoof, Richmond, Virginia, 1921; Dr. I. I. Lemann, New Orleans, Louisiana, 1922; Dr. M. L. Graves, Galveston, Texas, 1923; Dr. McKim Marriott, St. Louis, Missouri, 1924; Dr. Eliott R. Clark, Augusta, Georgia, 1925; Dr. W. A. Moursund, Dallas, Texas, 1926; Dr. L. J. Moorman, Oklahoma City, Oklahoma, 1927; Dr. Stuart Graves, University, Alabama, 1928; Dr. J. H. Musser, New Orleans, Louisiana, 1929; Dr. Robert Wilson, Charleston, South Carolina, 1930; Dr. Russell H. Oppenheimer, Emory University, Georgia, 1931; and Dr. Kenneth M. Lynch, Charleston, South Carolina, 1932.

PLACES OF MEETING AND GENERAL CHAIRMEN

The Southern Medical Association has held its annual sessions in the following cities with the following physicians as General Chairmen:

Chattanooga, Tennessee, 1906, organization meeting.
Birmingham, Alabama, 1907, *Dr. W. P. McAdory.
Atlanta, Georgia, 1908, *Dr. W. F. Westmoreland.
New Orleans, Louisiana, 1909, Dr. E. M. Hummel.
Nashville, Tennessee, 1910, *Dr. G. C. Savage.
Hattiesburg, Mississippi, 1911, Dr. W. W. Crawford.
Jacksonville, Florida, 1912, *Dr. J. D. Love.
Lexington, Kentucky, 1913, Dr. F. H. Clarke.
Richmond, Virginia, 1914, *Dr. McGuire Newton.
Dallas, Texas, 1915, Dr. E. H. Cary.
Atlanta, Georgia, 1916, Dr. Stewart R. Roberts.
Memphis, Tennessee, 1917, *Dr. Frank D. Smythe.
1918, Influenza pandemic, no meeting held that year.
Asheville, North Carolina, 1919, *Dr. H. H. Briggs.
Louisville, Kentucky, 1920, Dr. George A. Hendon.
Hot Springs, Arkansas, 1921, Dr. W. T. Wootton.
Chattanooga, Tennessee, 1922, Dr. J. B. Steele.
Washington, D. C., 1923, Dr. Thomas A. Groover.
New Orleans, Louisiana, 1924, Dr. Homer Dupuy.
Dallas, Texas, 1925, Dr. H. Leslie Moore.
Atlanta, Georgia, 1926, Dr. Frank K. Boland.
Memphis, Tennessee, 1927, Dr. E. C. Ellett.
Asheville, North Carolina, 1928, Dr. Paul H. Ringer.
Miami, Florida, 1929, Dr. Roy J. Holmes.
Louisville, Kentucky, 1930, Dr. W. Hamilton Long.
New Orleans, Louisiana, 1931, Dr. Frederick L. Fenno.

The above brief sketch is being presented first to inform the newer and younger members of the history of their organization, and second as a matter of record for those who are to follow. Little did the organizers in Chattanooga in 1906 realize that in a quarter of a century, the revamped Tri-State Association, rechristened the Southern Medical Association, would fill an indispensable need throughout the South, and become one of the largest and most influential medical organizations in the world.

*Deceased.

OFFICERS, SOUTHERN MEDICAL ASSOCIATION, 1931-1932

President—Dr. Lewis J. Moorman, Oklahoma City, Oklahoma.

First Vice-President—Dr. Frederick L. Fenno, New Orleans, Louisiana.

Second Vice-President—Dr. Charles Hartwell Cocke, Asheville, North Carolina.

Secretary-Manager—Mr. C. P. Loranz, Birmingham, Alabama.

Editor of Journal—Dr. M. Y. Dabney, Birmingham, Alabama.

Assistant Editor of Journal—Mrs. Eugenia B. Dabney, Birmingham, Alabama.

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Board of Trustees (All are Past-Presidents)—Dr. C. C. Bass, Chairman, New Orleans, Louisiana; Dr. J. Shelton Horsley, Richmond, Virginia; Dr. William R. Bathurst, Little Rock, Arkansas; Dr. Thomas W. Moore, Huntington, West Virginia; Dr. Hugh S. Cumming, Washington, D. C.; Dr. Felix J. Underwood, Jackson, Mississippi.

Section on Medicine—Dr. C. Sidney Burwell, Chairman, Nashville, Tennessee; Dr. William B. Porter, Vice-Chairman, Richmond, Virginia; Dr. Ernest B. Bradley, Secretary, Lexington, Kentucky.

Section on Pediatrics—Dr. Horton Casparis, Chairman, Nashville, Tennessee; Dr. Hughes Kennedy, Jr., Vice-Chairman, Birmingham, Alabama; Dr. Luther W. Holloway, Secretary, Jacksonville, Florida.

Section on Gastroenterology—Dr. Elmer B. Freeman, Chairman, Baltimore, Maryland; Dr. C. W. Dowden, Vice-Chairman, Louisville, Kentucky; Dr. Ernest H. Gaither, Secretary, Baltimore, Maryland.

Section on Pathology—Dr. M. Pinson Neal, Chairman, Columbia, Missouri; Dr. J. A. McIntosh, Vice-Chairman, Memphis, Tennessee; Dr. Harvey S. Thatcher, Secretary, Little Rock, Arkansas.

Section on Neurology and Psychiatry—Dr. Carrol C. Turner, Chairman, Memphis, Tennessee; Dr. R. G. Spurling, Vice-Chairman, Louisville, Kentucky; Dr. W. W. Young, Secretary, Atlanta, Georgia.

Section on Radiology—Dr. J. C. Dickinson, Chairman, Tampa, Florida; Dr. D. A. Rhinehart, Vice-Chairman, Little Rock, Arkansas; Dr. C. H. Heacock, Secretary, Memphis, Tennessee.

Section on Dermatology and Syphilology—Dr. Emmett R. Hall, Chairman, Memphis, Tennessee; Dr. M. T. Van Studdiford, Vice-Chairman, New Orleans, Louisiana; Dr. Dudley C. Smith, Secretary, University, Virginia.

Section on Surgery—Dr. J. M. T. Finney, Chairman, Baltimore, Maryland; Dr. A. G. Brenizer, Vice-Chairman, Charlotte, North Carolina; Dr. Daniel C. Elkin, Secretary, Atlanta, Georgia.

Section on Bone and Joint Surgery—Dr. Allen F. Voshel, Chairman, Baltimore, Maryland; Dr. J. Albert Key, Vice-Chairman, St. Louis, Missouri; Dr. J. W. White, Secretary, Greenville, South Carolina.

Section on Gynecology—Dr. Lawrence R. Wharton, Chairman, Baltimore, Maryland; Dr. Percy H. Wood, Vice-Chairman, Memphis, Tennessee; Dr. John W. Turner, Secretary, Atlanta, Georgia.

Section on Obstetrics—Dr. W. Bush Anderson, Chairman, Nashville, Tennessee; Dr. E. L. King, Vice-Chairman, New Orleans, Louisiana; Dr. Richard Paddock, Secretary, St. Louis, Missouri.

Section on Urology—Dr. Russell A. Hennessey, Chairman, Memphis, Tennessee; Dr. Neil S. Moore, Vice-Chairman, St. Louis, Missouri; Dr. Earl H. Floyd, Secretary, Atlanta, Georgia.

Section on Railway Surgery—Dr. D. Y. Roberts, Chairman, Louisville, Kentucky; Dr. E. Dunbar Newell, Vice-Chairman, Chattanooga, Tennessee; Dr. J. W. Palmer, Secretary, Ailey, Georgia.

Section on Ophthalmology and Otolaryngology—Dr. W. R. Buffington, Chairman, New Orleans, Louisiana; Dr. W. Likely Simpson, Vice-Chairman, Memphis, Tennessee; Dr. W. D. Gill, Secretary, San Antonio, Texas.

Section on Public Health—Dr. J. D. Applewhite, Chairman, Macon, Georgia; Dr. Joseph W. Mountin, Vice-Chairman, Washington, D. C.; Dr. Leon Banov, Secretary, Charleston, South Carolina.

National Malaria Committee (meeting conjointly with Southern Medical Association)—Dr. L. O. Howard, Honorary Chairman, Washington, D. C.; Dr. E. L. Bishop, Chairman, Nashville, Tennessee; Dr. Charles F. Craig, Chairman-Elect, New Orleans, Louisiana; Dr. Henry Hanson, Vice-Chairman, Jacksonville, Florida; Dr. Mark F. Boyd, Secretary, Tallahassee, Florida.

American Society of Tropical Medicine (meeting conjointly with Southern Medical Association, 1932)—Dr. Frank Smithies, President, Chicago, Illinois; Dr. E. L. Walker, First Vice-President, San Francisco, California; Dr. G. R. Callender, Second Vice-President, Washington, D. C.; Dr. Henry E. Meleney, Secretary-Treasurer, Nashville, Tennessee; Dr. Damaso de Rivas, Assistant Secretary, Philadelphia, Pennsylvania.

Southern Branch, American Public Health Association (meeting conjointly with Southern Medical Association, 1932)—Dr. E. L. Bishop, Organization Chairman, Nashville, Tennessee; Dr. H. S. Mustard, Organization Secretary, Nashville, Tennessee.

Section on Medical Education—Dr. Kenneth M. Lynch, Chairman, Charleston, South Carolina; Dr. John Walker Moore, Vice-Chairman, Louisville, Kentucky; Dr. Ernest W. Goodpasture, Secretary, Nashville, Tennessee.

Southern Branch, Society for Experimental Biology and Medicine (meeting conjointly with Southern Medical Association, 1932)—Dr. William H. Harris, Chairman, New Orleans, Louisiana; Dr. Ernest Carroll Faust, Vice-Chairman, New Orleans, Louisiana; Dr. Harold Cummins, Secretary, New Orleans, Louisiana.

Women Physicians of Southern Medical Association—Dr. Kate Savage Zerfoss, Chairman, Nashville, Tennessee; Dr. Maud Loeber, Vice-Chairman, New Orleans, Louisiana; Dr. Lillian H. South, Secretary, Louisville, Kentucky.

Woman's Auxiliary to the Southern Medical Association—Mrs. Charles E. Oates, President, North Little Rock, Arkansas; Mrs. A. A. Herold, President-Elect, Shreveport, Louisiana; Mrs. S. E. Driskell, First Vice-President, Jacksonville, Florida; Mrs. S. M. Blackshear, Second Vice-President, New Orleans, Louisiana; Mrs. J. Bonar White, Recording Secretary, Atlanta, Georgia; Mrs. M. J. Kilbury, Corresponding Secretary, Little Rock, Arkansas; Mrs. Mabel Mason, Treasurer, Lumberton, Mississippi; Mrs. S. A. Collom, Jr., Historian, Texarkana, Texas; Mrs. J. D. Perdue, Parliamentarian, Mobile, Alabama.

OFFICERS, JEFFERSON COUNTY MEDICAL SOCIETY, Birmingham, Alabama—Host to the Southern Medical Association, Twenty-Sixth Annual Meeting, November 16-18, 1932.

President—Dr. John D. Sherrill
Vice-President—Dr. R. G. Lovelady
Secretary-Treasurer—Dr. W. B. Hardy
Chairman Board of Censors—Dr. Cabot Lull
Immediate Past President—Dr. James R. Garber

Chairmen of Local Committees on Arrangements

General Chairman—Dr. James R. Garber
Honorary Vice-General Chairmen—Dr. James S. McLester, Dr. J. M. Mason, Dr. W. G. Harrison, and Dr. Seale Harris
Finance—Dr. Stewart H. Welch
Entertainment—Dr. Alfred A. Walker
Membership—Dr. R. H. Hamrick
Hotels—Dr. Cecil D. Gaston
Meeting Places—Dr. S. L. Ledbetter
Publicity—Dr. H. Earle Conwell
Alumni Reunions—Dr. Edward O'Connell
Scientific Exhibits—Dr. George S. Graham
Information—Dr. A. L. Glaze
Transportation—Dr. J. A. Meadows
Golf—Dr. A. B. Harris
Trap Shooting—Dr. A. L. Atwood
Women Physicians—Dr. Melson Barfield Carter
Ladies' Entertainment—Woman's Auxiliary, Mrs. John M. Akin, President; Mrs. Sid W. Collier, Chairman, and Mrs. S. L. Ledbetter, Co-Chairman.

Book Reviews

Minor Surgery of the Urinary Tract. By Hermon C. Bumpus, Jr., Ph.B., M.D., M.S., in Uro'ogy, F.A.C.S., Section on Urology, the Mayo Clinic; and Associate Professor of Urology, the Mayo Foundation. With a Chapter on Caruncles by John L. Crenshaw, M.D., Section on Urology, the Mayo Clinic; and Associate Professor of Uro'ogy, the Mayo Foundation; and a Chapter on Postoperative Care by Anson L. Clark, M.D., M.D., Section on Urology, the Mayo Clinic, Rochester, Minnesota. Octavo of 124 pages with 57 illustrations. Philadelphia and London: W. B. Saunders Company, 1932. Cloth, $3.00.

Bumpus first discusses the anesthesia, preparation of the patient, equipment, sterilization and irrigating solutions. Then caruncles, strictures, hypertrophy and carcinoma of the prostate gland, stones of the bladder, tumors and infections of the bladder and stones in the ureters receive attention. Each step in treatment is explained in detail and numerous illustrations clarify the text.

The use of the high frequency current in transurethral resection is graphically described. He states: "That this procedure will ever completely replace prostatectomy is extremely doubtful, for in many cases the hypertrophy is so extensive * * *" The evaluation of the methods is based upon their employment of it for the past ten years at the Mayo Clinic.

The final chapter is on postoperative care and includes a number of ketogenic diets. A large part of the operative procedures described is often considered major work. However, much of it can be done in the office. This is an excellent book in this field.

Diseases of the Coronary Arteries (Myocarditis). By John C. Sutton, M.S., M.D., Associate Professor of Medicine, Northwestern University; and Harold Lueth, Ph.D., M.D., formerly Instructor in Physiology, Northwestern University, Chicago. 164 pages with tables, charts and illustrations, some in colors. St. Louis: C. V. Mosby Company, 1932. Cloth, $5.00.

Since the opening quotation of the book is from Vaquez, that "the chapter of myocarditis is one of the most obscure in cardiac pathology," it is interesting to note the extensive literature listed in the bibliography upon the subject of chronic cardiovascular disease. The authors state that the book is the result of observations upon a large group of chronic cardiovascular patients in the wards and follow-up clinic.

One feels that perhaps the authors should have given more thought to the arrangement of the subject matter so that the practitioner could find its presentation in a more orderly sequence.

The authors have drawn freely from the work of others in the profuse illustrations of each chapter, which in the main are good. But several of the electrocardiograms are of rather poor technic both as regards the electrocardiography and the photography of the tracings.

The chapters upon pathology, physiology and pharmacology show extreme care and thoroughness and will well repay the reader for their careful study.

One can but regret that the authors have not included chapters upon diseases of the arteries with especial reference to arteriosclerosis and chronic nephritic conditions so often associated with coronary sclerosis.

With the exception of a careless arrangement of the subject matter, the book is well written and of real value to the clinician as a review of the more recent work upon chronic diseases of the coronary arteries, and serves to bring a fresh interest in myocarditis which had become a term almost of disuse in cardiology. The more recent work in diseases of the coronary arteries, of which this book is somewhat of a resume, has served to renew the interest in this condition in the treatment of the chronic cardiovascular invalid.

Foods in Health and Disease. By Lulu G. Graves, Consultant in Nutrition and Diet Therapy; Formerly Professor of Home Economics, Cornell University. 390 pages with illustrations, tables and charts. New York: The Macmillan Company, 1932. Cloth, $3.50.

Of the writing of books on diet there seems to be no end. Yet each new work has something of particular interest. The value of this volume lies in its appeal to the non-professional person as well as the nurse and the physician. The chapters on food elements and functions of each are well presented. Many important facts about diet for health are brought within the present knowledge. The second chapter deals with diseases and the proper application of food to each, presented in such a way that the housekeeper will find it easily understood and effectively applied. The physician can be better able to prescribe his diets with the aid of this excellent treatise.

An Experimental and Clinical Study of Pain in the Pleura, Pericardium and Peritoneum. By Joseph A. Capps, M.D., Professor of Clinical Medicine, University of Chicago. With the collaboration of George H. Coleman, M.D., Assistant Professor of Medicine, Rush Medical College. A Foreword by Anton J. Carlson, M.D., Ph.D., Chairman of the Department of Physiology, University of Chicago. 99 pages, illustrated. New York: The Macmillan Company, 1932. Cloth, $3.00.

Pain is the guidepost to diagnosis. Dr. Capps stuck a trocar into the pleura, pericardium or peritoneum, inserted a wire through the trocar and elicited pain in certain areas. He has charted the points of origin and the reflex points in a large number of cases. As simply he tells of it in his book. He describes the innervation of the various areas and explains the reasons for the reflex pain. Excellently written, ingeniously executed, this book is not only a welcomed addition to medical literature, but serves to show the importance of clinical alertness.

Book Reviews continued on page 26

SOUTHERN MEDICAL NEWS, page 26

THE SUCCESS OF A PIONEER

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Continued from page 1108

Handbook of the Vaccine Treatment of Chronic Rheumatic Diseases. By H. Warren Crowe, D.M., B.Ch. (Oxon.), M.R.C.S., L.R.C.P., Director of the Charterhouse Rheumatism Clinic; Late Consulting Physician (Vaccine Treatment) Yorkshire Home for Incurable and Chronic Diseases. Second Edition. 79 pages. New York and London: Oxford University Press, 1932. Cloth, 80c.

The same technic is preserved in this edition as in the first, but the dosage is smaller. Dr. Crowe claims that by the use of this vaccine (CRC), which is composed of streptococcus and M. deformans, he has had excellent results in 49.3 per cent and improvement in 38.4 per cent of the cases which received the treatment. In a collected series as recorded by general practitioners, 23 per cent were symptom-free and 62 per cent showed improvement. He maintains that if the dosage is kept small enough to get a response rather than a reaction, good results will be achieved. Further trial of this stock vaccine should prove interesting.

Southern Medical News

PANAMERICAN MEDICAL ASSOCIATION

The Fourth Congress of the Panamerican Medical Association is to be held in Dallas, Texas, beginning Tuesday, March 21, 1933. Dr. John O. McReynolds, Dallas, one of the Vice-Presidents of the Association, has been named President (General Chairman) of the Congress. Invitations have been extended to the physicians of all Latin American countries, possessions of the West Indies and Canada. The three previous congresses of the Association have been at Havana, Cuba, Panama City, Panama, and Mexico City, Mexico. Physicians of the United States are cordially invited to attend and participate in the Fourth Congress at Dallas next March. Dr. Francisco M. Fernandez, Havana, Cuba, is President of the Panamerican Medical Association, and Dr. J. E. Lopez Silvero, Havana, Cuba, is Executive Secretary.

SOUTHEASTERN SURGICAL CONGRESS

Announcement is made that the Fourth Annual Assembly of the Southeastern Surgical Congress is to be held in Atlanta, Georgia, March 6-7-8, 1933, three days instead of two as formerly. The officers promise an even better program than the previous assemblies. Dr. Frank K. Boland, Atlanta, Georgia, is President of the Congress, and Dr. B. T. Beasley, Doctors Building, Atlanta, Georgia, is Executive Secretary.

ALABAMA

Jackson County Health Department offices, Scottsboro, was the location of the second of a series of chest clinics being conducted by the State Department of Health.

The Randolph County Medical Society held its regular meeting in Cuthbert in July and was addressed by Dr. Clarence Bennett, Eufaula.

The Alabama Hospital Association, at its recent meeting in Birmingham, had as the guest of honor and chief speaker General Frank T. Hines, Director, Veterans' Bureau Administration.

Deaths

Dr. S. H. Mann, Birmingham, aged 58, died September 15 from heart failure.

Dr. Fred D. Haston, Jasper, aged 51, died August 30.

Dr. Benjamin James Baldwin, Montgomery, aged 75, died July 10 of acute intestinal obstruction.

Dr. Roland Curtin Evans, Leighton, aged 56, died June 27 in a Sheffield hospital.

Dr. William Edward Wright, Fairfield, aged 48, died July 13 of pulmonary tuberculosis.

Dr. Henry Franklin Wilkins, Birmingham, aged 62, died July 17 in a United States Veterans' Hospital.

ARKANSAS

The Crawford County Medical Society met recently in Van Buren, at which meeting the following physicians were elected to serve on the Public Relations Committee: Dr. M. S. Dibrell, Van Buren; Dr. F. G. Engler, Mountainburg; and Dr. J. A. Wigley, Mulberry.

The Clay County Medical Society was entertained recently by Dr. and Mrs. J. P. Hiller, Pollard, with a chicken supper, followed by the regular program.

Dr. Verdo T. Webb, Little Rock, is the newly appointed Health Officer of Little Rock, succeeding Dr. Charles R. Moon, resigned.

The Leo N. Levi Memorial Hospital and Charles Steinberg Clinic Staffs, Hot Springs, will meet in October for their second Clinical Conference.

Dr. George Holitik has moved from Blue Ball to Waldron to practise.

Deaths

Dr. C. C. Bruton, Nella, aged 80, died June 5 of senility.

Dr. Seaborn Jennings Fuller, Magazine, aged 63, died April 7 of heart disease.

Dr. David Crockett Walt, Little Rock, aged 68, died June 22.

DISTRICT OF COLUMBIA

The American Public Health Association will meet in Washington October 24 to 27 for its sixty-first annual session, with headquarters at the Willard Hotel.

The first hospital in Washington for the treatment and care of women with cancer is soon to be built on the grounds of Garfield Memorial Hospital.

The International Medical Club, Washington, organized for the purpose of entertaining visiting physicians in Washington from foreign countries, recently had as their guest of honor at a luncheon Professor Erich Ruttin, Vienna. Dr. A. B. Bennett, Washington, President of the Club, presided.

Dr. Edmund Horgan, Washington, has gone to Europe as a delegate from the American Medical Association to attend the Centenary meeting of the British Medical Association.

Deaths

Dr. Victor A. Aimone, Washington, aged 45, died July 13.

FLORIDA

The Florida Railway Surgeons' Association held its thirteenth annual meeting recently and elected the following officers for the ensuing year: Dr. G. C. Tillman, Gainesville, President; Dr. Jack Halton, Sarasota, President-Elect; Dr. Leland F. Carlton, Tampa, Vice-President; and Dr. E. W. Warren, Palatka, Secretary-Treasurer.

Dr. W. H. Dyer, Tampa, announces the opening of a new hospital in July.

Dr. Roy J. Holmes, Miami, accompanied by Mrs. Holmes, has gone to Europe, where he will visit the clinics of different countries and attend the one hundredth anniversary meeting of the British Medical Association.

Dr. O. G. Kendrick, Tallahassee, was the principal speaker at a recent luncheon meeting of the Kiwanis Club.

Dr. and Mrs. L. W. Blake, Bradenton, recently entertained members of the Rotary Club at a fish fry at their beach home at Anna Maria.

Dr. J. T. Bowen, Dr. W. H. Groves and Dr. F. E. Kaufman, all of Clearwater, recently examined forty-six children at an annual clinic conducted by the Parent-Teachers' Association.

Dr. Meredith Mallory, Orlando, spent the month of August in Chicago studying.

Dr. M. C. Wilson, Miami, attended a clinic at Johns Hopkins Hospital, Baltimore, during the summer.

Dr. Earl C. MacCorty, St. Petersburg, attended surgical clinics in Boston during the summer.

Dr. H. P. Bevis, Arcadia, did postgraduate work in Chicago during the summer.

Dr. A. L. Stebbins has moved from Howey-in-the-Hills to Punta Gordo to practise.

Dr. Thomas W. Hutson, Miami, spent some time this summer attending the Mayo Clinic at Rochester, Minnesota.

Dr. J. P. Tomlinson, Jr., Lake Wales, and Miss Charlotte Bassage were married June 30.

Dr. H. O. Brown, Clearwater, and Miss Mary Bakas were married recently.

Dr. John L. Williams and Miss Lila Cay Cochran, both of Tallahassee, were married July 28.

Continued on page 28

Definite Diagnostic Evidence of Bone Disease

From its inception, radiography has been invaluable in the localization and reduction of fractures. But today its value extends much farther into the field of orthopedics. Improved equipment, highly developed technic, and uniform films of increased sensitivity make it possible for the radiologist to obtain accurate information about the bone structure itself.

The fine detail which the radiologist secures supplies definite diagnostic evidence in bone pathology. Malignancies are quickly recognized . . . types of bone destruction differentiated. Authorities have found that such radiographs yield positive diagnostic evidence in a majority of instances.

* * *

Eastman Ultra-Speed and Eastman Diaphax X-ray Films, which are such a marked contribution in broadening the general scope of radiography, are of unusual importance in examinations of bones and joints. Because of their sensitivity and constant uniformity, they greatly extend the radiologist's service. In modern medical practice, full use of this service should be made in all cases presenting disorders and injuries of bones and joints.

Lateral radiograph of middle third of the tibia and fibula, demonstrating a tibial osteosarcoma.

Lateral radiograph of knee joint exhibiting a typical case of joint tuberculosis.

"Radiography and Clinical Photography" is a bimonthly magazine devoted to news of the progress of these services in medical practice. Copies will be sent to you regularly without charge.

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Continued from page 26

Dr. Will S. Nichols, Lake City, and Miss Eleanor Haile were married in June.

DEATHS

Dr. James J. Beaty, Jennings, aged 70, died June 22 of heart disease.

Dr. Henry Embry McMurray, Tampa, aged 50, died July 4.

Dr. Rose F. Jackson, St. Petersburg, aged 62, died July 6 of chronic nephritis.

Dr. John G. Slappy, Jeffersonville, aged 78, died June 27.

Dr. William Tatum Pace, Smyrna, aged 70, died July 26 in a Marietta Sanitarium.

Dr. Edward W. Boyd, Atlanta, aged 56, died suddenly July 13.

Dr. James H. Latimer, Waycross, aged 62, died July 13.

Dr. W. L. Wade, Parrott, aged 59, died July 19.

Dr. N. L. Grant, LaGrange, aged 57, died suddenly July 23.

Dr. Charles J. Vaughn, Atlanta, aged 75, died July 21.

Dr. Millard F. Matthews, Athens, aged 63, died June 25.

Dr. Wanzie W. Edwards, Butler, aged 54, died April 27.

GEORGIA

The Chattahoochee Valley Free Medical Clinic, West Point, opened in July to care for the indigent sick.

Dr. H. A. Mobley, Vienna, is the newly elected Commissioner of Health of Dooly County.

Dr. W. W. Chrisman, Macon, has been doing postgraduate work at Barnes Hospital, St. Louis, this summer.

Helen Branham is the newly appointed Acting Superintendent of the new Ware County Hospital, Waycross, and Acting Superintendent of Nurses.

A new Health Unit has been announced, consisting of the counties of Walker, Dade and Catoosa, with Dr. Fred H. Simonton, who has been in charge of Federal health work in the section recently, as Health Commissioner for the new unit. Headquarters will be in LaFayette.

The Brooks County Board of Health has organized a clinic for the treatment of venereal diseases. Examinations are made once a week by physicians of Quitman.

DEATHS

Dr. Patrick Cleveland Simmons, Arlington, aged 52, died May 29 of meningitis.

Dr. Charles L. Tucker, Griffin, aged 61, died June 29 at a hospital in Griffin.

Dr. Christopher Gadsden Hay, Savannah, aged 84, died July 2.

KENTUCKY

Dr. Ollie M. Goodloe, Louisville, has been appointed to succeed Dr. Sam R. Page as County Health Officer of Breathitt County.

Dr. Gradie R. Roundtree, Horse Cave, is the newly appointed Health Officer of Adair County.

Dr. Charles Fred Blankenship, Hawesville, is the newly appointed Health Officer of Hancock County.

Dr. Carl N. Gambill, Saylersville, has been appointed to succeed Dr. Miriam Marting, resigned, as Health Officer of Greenup County.

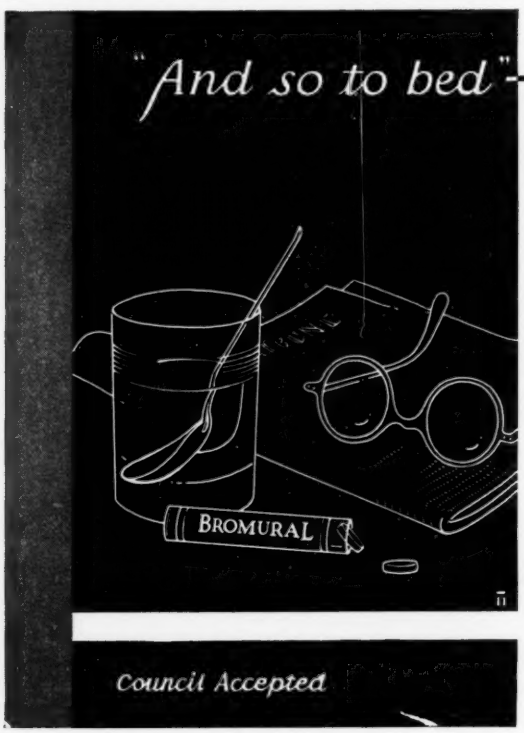
Dr. Oscar O. Miller, Louisville, recently addressed a meeting of the Adair, Green, Taylor and Marion Counties Medical Society.

Dr. Paul A. Turner, Louisville, was a speaker recently at a meeting of the Four-County Medical Society of Hickman, Fulton, Graves and Calloway Counties.

Miss Mary L. Hicks, Louisville, Executive Secretary, Louisville Health Council, Community Chest, is serving as Acting Superintendent of the Norton Memorial Infirmary, Louisville, succeeding Miss Alice M. Gaggs, who has resigned as Superintendent.

Dr. Ernest M. Ewers, Somerset, has resigned as Health Officer of Pulaski County.

Continued on page 32



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Colonel, Medical Reserve Corps; Flight Surgeon Air Corps, U. S. Army; Medical Examiner, Aeronautics Branch, U. S. Department of Commerce, Seattle, Washington

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(Sou. Med. Jour.)

Continued from page 28

The Sixth Councilor District Medical Society met in Lebanon in August, with the following physicians on the program: Dr. Emmet F. Horine, Dr. Morris M. Weiss, and Dr. Curran Pope, Louisville; and Dr. Caswell C. Turner, Glasgow.

DEATHS

Dr. Charles George Lucas, Louisville, aged 63, died July 7 of heart disease.

Dr. Christopher Balthus Preston, Ashland, aged 50, died June 2 of carcinoma of the pancreas.

Dr. Robert E. Limerick, Corinth, aged 73, died May 28 of uremia.

LOUISIANA

Dr. E. L. Sanderson, Shreveport, announces the opening of a new cancer clinic.

Dr. Charles J. Bloom, New Orleans, was a guest speaker at a meeting of the Calhoun County Medical Society in Anniston, Alabama, recently.

DEATHS

Dr. Pennuel Columbus Worley, Shreveport, aged 59, died July 21 of acute intestinal obstruction.

Dr. Abner O. Clark, Ridge, aged 73, died June 27 of heart disease.

Dr. John Duke Kilgore, Minden, aged 49, died July 27 from injuries received in an automobile accident.

MARYLAND

The Bone and Radiological Conference, sponsored by the Surgical Pathological Laboratory of Johns Hopkins Hospital, Baltimore, was held in September under the direction of Dr. Joseph C. Bloodgood and Dr. Charles Geschickter, both of Baltimore.

The State Health Department's Bureau of Child Hygiene sponsored a series of child health conferences held in more than sixty places during the summer where their Healthmobile stopped for examinations and instructions to parents on the care of infants and children.

A special Public Health District, has been created in Baltimore for the training of public health workers, through a grant of funds by the Rockefeller Foundation through the School of Hygiene and Public Health of Johns Hopkins University.

Baltimore City Hospitals have started construction work on a general hospital unit, with a provision of 410 beds and ranking in size next to Johns Hopkins Hospital.

The University of Maryland School of Medicine dedicated its July issue of the Bulletin to the memory of Dr. C. Hampson Jones, late Professor of Hygiene and Public Health at the Medical School and Commissioner of Health of Baltimore.

DEATHS

Dr. Daniel F. Shipley, Westminster, aged 76, died July 9 of heart disease.

MISSISSIPPI

The State Board of Health announces that arrangements have been made with the Federal children's bureau for four additional courses in obstetrics for physicians to be given by Dr. James R. McCord, Atlanta, Professor of Obstetrics and Gynecology, Emory University School of Medicine. These courses will be given one week in October, one in November, and two weeks in December.

Dr. Walter C. Brewer, Columbus, spent some time this summer doing special work at the Mayo Clinic, Rochester.

Dr. W. W. Diamond has moved from Jackson to Magee, where he has opened a small hospital.

Dr. G. C. Russell, Jackson, visited the Mayo Clinic this summer.

Dr. W. W. Hickman has moved from Louisville to Picayune, where he has the practice of the L. O. Crosby Saw Mill Company.

Dr. M. C. Henry, formerly of Detroit, Michigan, has located in Jackson, where he will do general practice.

Dr. R. R. Halfacre has moved from Sumrall to Jackson, where he will be a member of the medical staff of the insane hospital.

Dr. Harvey F. Garrison, Jr., has located in Jackson, where he is associated with his father, Dr. H. F. Garrison, practising pediatrics.

Continued on page 34

". . . Klim . . . directly responsible for decrease in infant mortality rate . . ."

ON September 10, 1932, in a public address, the health officer of a great city in the Southwest made in effect this significant statement:

"I believe that the regular use of Klim (powdered whole milk) in the children's clinics of this city has been directly responsible for the very gratifying decrease in what was an unduly high infant mortality rate."

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KLIM

POWDERED WHOLE MILK

Continued from page 32

Dr. R. B. Zeller, formerly of Jackson, has opened offices in Hazlehurst.

Dr. L. Alexander, formerly of Texas, has become house surgeon of the South Mississippi Charity Hospital.

Dr. Chester A. Walker has moved from Ovett to Gulfport, where he will be connected with the Old Soldiers' Home.

Dr. A. E. Kennedy, Magee, attended the Southern Pediatric Seminar at Saluda, North Carolina.

Dr. Joe Roberts, Yazoo City, is leaving to locate in Longview, Texas, where he will be assoociated with Dr. Hurst, doing eye, ear and throat work.

Mr. W. Hamilton Crawford, Hattiesburg, Superintendent of the South Mississippi Infirmary, directed the Round Table Discussions at the spring meeting of the Alabama Hospital Association in Birmingham.

The Mississippi State Board of Health has arranged through the Rockefeller Foundation for fellowship for one year's study for the following physicians: Dr. J. T. Googe, Meridian, Dr. George E. Riley, Jackson, and Dr. Archie L. Gray, Hazelhurst.

DEATHS

Dr. Robert Patrick, Woodville, aged 86, died May 28.

MISSOURI

The following St. Louis physicians will be on the program of the International Assembly of the Interstate Postgraduate Medical Association of North America at its meeting in Indianapolis in October, and will conduct clinics: Dr. Elsworth S. Smith, Dr. David P. Barr, and Dr. W. McKim Marriott.

Dr. John R. Caulk, St. Louis, addressed the eleventh annual session of the American Congress of Physical Therapy in New York in September.

The Missouri Tuberculosis Association held its twenty-fifth annual meeting in Jefferson City in September.

The Kansas City Southwest Clinical Society held its September session at Bethany Hospital September 13 with Dr. J. Albert Key, St. Louis, as the visiting speaker. Dr. Key also conducted a clinic on arthritis.

Dr. W. McKim Marriott, St. Louis, Dean and Professor of Pediatrics of Washington University School of Medicine, recently gave a series of lectures and clinics in the University of California School of Medicine.

Dr. M. Pinson Neal, Columbia, Professor of Pathology, University of Missouri School of Medicine, who has been Acting Professor of Pathology and Bacteriology at the University of Tennessee School of Medicine, Memphis, for the summer, and also Acting Director of the Laboratory of the Memphis General Hospital, has returned to his regular school work at Columbia.

Dr. Malcolm A. Bliss, St. Louis, was presented by the Governor with the distinguished service medal for conspicuous service in private life, this being the first medal to be awarded since it was authorized by the last Legislature.

The Five County Medical Society of Southeast Missouri held its quarterly meeting in New Madrid in the early summer.

Dr. Elmer W. Nahrwold and Miss Magdalen Lange, both of St. Louis, were married August 4.

DEATHS

Dr. Lawrence Letton Smith, Bethel, aged 64, died suddenly July 4 of cerebral hemorrhage.

Dr. John M. McCully, Clarence, aged 81, died June 16.

Dr. Frederick L. Deck, St. Louis, aged 68, died June 10.

Dr. George Robertson, Eolia, aged 67, died June 13 of septicemia.

Dr. William D. Swaney, Columbia, aged 59, died June 4 of heart disease.

Dr. William Alvin Porter, Higginsville, aged 60, died July 2.

Dr. Robert Henry Goodier, Hannibal, aged 71, died July 22.

NORTH CAROLINA

Dr. Hubert A. Royster, Raleigh, made the principle address at the commencement exercises of the Masonic Orphanage at Oxford in the early summer.

Dr. N. M. Gibbs, New Bern, has been reappointed County physician for Craven.

Dr. C. L. Walton, formerly of the Johnson Memorial Hos-

Continued on page 36

SIMPLIFIED SILVER NITRATE THERAPY

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12—102

Continued from page 34

pital, Abingdon, Virginia, has located at Glen Alpine and will be associated with Dr. B. L. Long.

Dr. E. Marvin Mann has become associated with Dr. S. M. Mann at Moyock for the practice of medicine.

The new Lyday Memorial Hospital was opened in Brevard the early part of the summer.

Dr. Harold Benjamin Smith, North Wilkesboro, and Miss Mary Richardson McLeod were married June 11.

DEATHS

Dr. Joseph Powell Speight, Rocky Mount, aged 47, died suddenly July 29 of heart disease.

OKLAHOMA

At a recent meeting of the Adair County Medical Society visiting physicians and members were entertained with a fish fry, after which a scientific program was enjoyed.

Dr. R. M. Howard, Oklahoma City, has been elected President of the American Goiter Association for the ensuing year.

Dr. John F. Park, McAlester, has returned from some time spent in Europe visiting clinics.

Dr. Joseph W. Kelso, Oklahoma City, and Mrs. Elsie E. Carter were married July 20.

DEATHS

Dr. James William May, Headrick, aged 52, died July 11.

SOUTH CAROLINA

Announcement is made by the roentgenologists of the State of the organization of the South Carolina X-Ray Society, with the following physicians elected to serve as officers for the coming year: Dr. F. D. Rogers, Columbia, President; and Dr. Robert B. Taft, Charleston, Secretary.

The Pickens County Medical Society met recently at the home of Dr. John L. Valley, Pickens, with the following physicians on the program: Dr. James R. Young and Dr. Howard Anthony, Anderson; Dr. Edgar A. Hines, Seneca; Dr. Thaddeus B. Reeves and Dr. Ernest W. Carpenter, Greenville; and Dr. William A. Sheldon, Liberty.

DEATHS

Dr. Donald D. Salley, Cope, aged 62, died June 16 in an Orangeburg hospital.

Dr. Jefferson Davis Austin, Clinton, aged 71, died July 21 of arteriosclerosis.

Dr. John Ebenezer Pressley, Abbeville, aged 49, died June 8 in an Atlanta hospital.

TENNESSEE

The Western State Hospital, Bolivar, announces the completion recently of a new building to house the insane negro patients.

Dr. Robert B. Gaston, Lebanon, formerly Superintendent of McFarland Hospital, Lebanon, will operate the new Martha Gaston Hospital, formerly known as the Cedarcroft Hospital.

The Sullivan-Johnson Counties Medical Society had as their guest speaker at a recent meeting Dr. Paul B. Welch, Coral Gables, Florida.

The Gibson County Medical Society at a meeting in Trenton recently had as their guest speakers Dr. Rudolph W. Holmes, Chicago, and Dr. Frederick C. Freed, New York.

Dr. C. D. Giles has moved from Paris to Gallatin to practise.

Dr. P. E. Parker has moved from Sweetwater to Etowah.

Dr. Alfred Farrar, formerly of Nashville, has located in Shelbyville.

Dr. H. C. Capps has located in Martin for the practice of medicine, coming there from Louisville, Kentucky.

Dr. J. P. Gilbert, Nashville, has moved his offices to the Doctors Building, where he will practise neuro-psychiatry.

Dr. William G. Stephenson and Miss Mamie Louise Barnes, both of Chattanooga, were married June 15.

DEATHS

Dr. Gilbert N. Bailey, Baileyton, aged 65, died July 5.

Dr. Cornelius S. Powell, Somerville, aged 53, died June 10 of cardiorenal vascular disease.

Continued on page 38

TRADE PYRIDIUM MARK

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Continued from page 36

Dr. James Jaynes, Sneedville, aged 82, died June 27 of nephritis.

TEXAS

Dr. E. H. Cary, Dallas, has been unanimously reelected President of the Kessler Plan Association of Dallas.

Dr. R. S. Mallard, Fort Worth, attended clinics in New York City during the summer.

Dr. Coleman C. Burns, Henderson, and Miss Maudie Mae Lilly were married June 25.

Dr. Grace Humphreys Hood, Fort Worth, and Mr. Ross Turner were married recently.

Dr. P. L. Allen, Weatherford, and Miss Madelon Jo Kincannon were married July 16.

Deaths

Dr. Harvey Gill Baldwin, Seagoville, aged 71, died in Dallas June 8 of cerebral hemorrhage and arteriosclerosis.

Dr. Amzie B. Jenkins, Waxahachie, aged 78, died in June.

Dr. Charles Haskins Reagan, Beeville, aged 69, died in June of myocarditis.

Dr. Samuel Streghorn Beakley, San Antonio, aged 63, died July 4 of acute dilatation of the heart.

Dr. Robert Lee McLellan, Eagle Lake, aged 61, died July 8 of myocarditis.

Dr. William N. McGee, McAllen, aged 66, died May 30.

Dr. Luther Biggs Palmer, Paris, aged 61, died June 3 of cerebral hemorrhage.

VIRGINIA

The Fairfax County, Virginia, Medical Society has elected the following officers for the coming year: Dr. William P. Caton, Accotink, President; Dr. Jessie Scott, Vienna, Dr. Tracy Nolan, Cherrydale, Vice-Presidents; Dr. A. L. Carson, Falls Church, Secretary; and Dr. F. M. Brooks, Falls Church, Treasurer.

Dr. Maxwell E. Lapham will conduct a second circuit of postgraduate courses on prenatal and postnatal instructions, with Richmond, Petersburg, Farmville and Lawrenceville as centers.

Dr. Roy K. Flannagan, Richmond, Assistant State Health Commissioner, has been detailed to act as Medical Advisor to the State Department of Public Welfare.

Dr. A. T. Sheffield, formerly of Suffolk, has located at Sperryville for the practice of general medicine.

Dr. Charles H. Patterson has located in Lynchburg for the practice of medicine, having just completed his internship at the Virginia Baptist Hospital in that city.

Dr. Joseph F. Geisinger, Richmond, is the newly elected President of the Westover Hills Civic Club.

Dr. D. C. Boatwright, Marion, formerly of the medical staff of the Southwestern State Hospital, has resigned his position and is now engaged in private practice.

Dr. F. Clyde Bedsaul has located at Floyd and is associated with Dr. R. M. DeHart.

Dr. Robert V. Funston, formerly of Detroit, is the newly elected Professor of Orthopedic Surgery in the University of Virginia School of Medicine, succeeding Dr. Allen F. Voshel, resigned.

Dr. Wade H. Carter has located at Newport for the practice of medicine.

Dr. O. W. Carper has located at Front Royal, where he will engage in general practice.

Dr. Fred Taylor Renick has located at Crozet and is engaged in general practice.

Dr. John C. Neale, Jr., has located at Hilton Village, having recently completed his internship at Memorial Hospital, Richmond.

Dr. W. L. Powell, Roanoke, is the newly appointed Chairman of the Committee on Group Societies of the Medical Society of Virginia, succeeding Dr. Charles R. Grandy, deceased. Dr. William Lett Harris, Norfolk, and Dr. W. B. McIlwaine, Petersburg, are the other two members of the Committee.

Dr. Clarence Porter Jones, Newport News, has succeeded Dr. E. C. S. Taliaferro, deceased, as Chairman of the Walter Reed Commission of the State Society. Dr. O. T. Amory, Newport News, has been appointed a new member of the Commission.

The Southwestern Virginia Medical Society held its semi-annual meeting in Roanoke September 20 and 21.

Continued on page 40

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E·R·SQUIBB & SONS NEW YORK
IODOBISMITOL SQUIBB
Administer intramuscularly, preferably into the upper outer quadrant of the gluteus maximus muscle. The contents of one ampul, (2 cc.) represent an average therapeutic dose. Injections should be made every three days. At least 8 to 12 doses should be given without interruption. Best results are usually obtained by the continued administration over long periods of time without rest intervals. Iodobismitol treatment need not be interrupted when arsphenamines are being given.
Care should be taken that there is no leakage back into the subcutaneous tissues as collections of Iodobismitol beneath the skin will cause lump formation. To avoid trackage of the solution back along the needle, after filling the syringe, draw about ½ cc. of air into it and when injecting clear the needle of Iodobismitol with this air at the end of the stroke.

(For Literature, Write Professional Service Dept., E. R. Squibb & Sons, 745 Fifth Ave., N. Y. C.)

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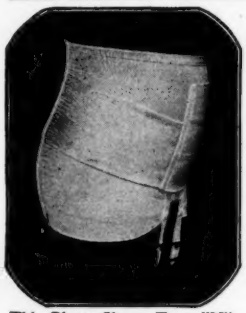
Binder and Abdominal Supporter



Gives perfect uplift and is worn with comfort. Made of Cotton, Linen or Silk, washable as underwear.

Three distinct types of Storm Supporters — many variations of each type.

This Photo Shows Type "N"

STORM Supporters are made for all conditions needing abdominal uplift. Ptosis, Hernia, Pregnancy, Obesity, Relaxed Sacro-Iliac, Articulations, Kidney Conditions, Post-Operative Support, etc.

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CARBON DIOXID AND OXYGEN MIXTURES

TIME TELLS!

In the last twenty years in America every so often some new form of anesthetic has been put on the market, sometimes with most startling claims. Most of them vanish as rapidly as they come, because they cannot stand the test of time.

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Puritan Compressed Gas Corp.
Sales Offices in Most Principal Cities
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Continued from page 38

The Medical Society of Virginia has moved its quarters and is now housed in the new building of the Richmond Academy of Medicine.

The Buxton Clinic, Newport News, was opened recently, and is to be operated in connection with the Elizabeth Buxton Hospital.

Dr. Robert C. Bryan, Richmond, has moved into offices in the Ambassador, 1108 West Franklin Street.

Dr. Blanton L. Hillsman and Miss Evelyn E. Holdcroft, both of Richmond, were married July 26.

Dr. William E. Tomlinson, Jr., and Miss Margaret Corinne Peaco, both of Richmond, were married recently.

Dr. Nathan Palmer Fitts, Williamsburg, and Miss Lucille Branderberger were married July 12.

Dr. Charles Harold Spiggle, Strasburg, and Miss Ann Margaret Chiles were married July 20.

Dr. Frederick Lionel Finch, Jr., and Miss Melba Mayhew Gravely, both of Richmond, were married June 23.

Dr. Delbert T. Saffer, Aldie, and Miss Martha Garnett Gresham were married May 15.

Dr. Thomas Meredith Winn, Covington, and Miss Violet Gary were married June 30.

Dr. Roshier W. Miller and Mrs. Sallie Knight Hill, both of Richmond, were married July 6.

Dr. Randolph L. Anderson, Richmond, and Miss Ruth Grove were married June 30.

DEATHS

Dr. Edward Carrington Stanard Taliaferro, Norfolk, aged 57, died July 28 of complications following an operation for appendicitis.

WEST VIRGINIA

The Monongalia and Preston County Medical Societies held their annual joint meeting in July at the Hopemont Sanitarium, Hopemont, with approximately one hundred members and visitors present.

DEATHS

Dr. Harry Lee Beard, Lewisburg, aged 63, died August 16.

Classified Advertisements

ASSISTANCE OFFERED TO MEDICAL WRITERS. Research. Abstracts. Translations (all languages). Papers prepared from author's data. Ten years' experience with leading physicians and appointments on medical journals of highest standing. I employ no assistants; all my work is done personally and is reliable. Florence Annan Carpenter, 413 St. James Place, Chicago, Ill.

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The "MESCO" Laboratories manufacture the largest line of Ointments in the world. Sixty different kinds. We are originators of the Professional Package. Specify "MESCO" when prescribing ointments. Send for lists.

Manhattan Eye Salve Co.
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"If one wishes to fortify cod liver oil, it is far more reasonable and efficacious to increase its potency by adding a small amount of viosterol, which is a specific in the prevention and cure of rickets, as it brings about calcification not only of the bone but of the proliferating cartilage as well." (Hess, Alfred F., Am. J. Dis. Child. 41:1081; May, 1931.)

MEAD'S 10 D Cod Liver Oil with Viosterol is the choice of many discriminating physicians because it represents the long pioneer experience of Mead Johnson & Company in the fields of *both* cod liver oil *and* viosterol.

Mead's 10 D Cod Liver Oil is the only brand that combines *all* of the following features:

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Mead Johnson & Company Pioneers in Vitamin Research **Evansville, Indiana, U.S.A.**

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(HALIBUT LIVER OIL)

is now available

either **PLAIN** *or with* **VIOSTEROL**

PARKE-DAVIS HALIVER OIL WITH VIOSTEROL-250 D was introduced to the medical profession in January of this year. This product, which is obtained from the liver of the halibut, is standardized to contain sixty times the vitamin A potency of high-grade cod-liver oil and is equal to Viosterol in vitamin D.

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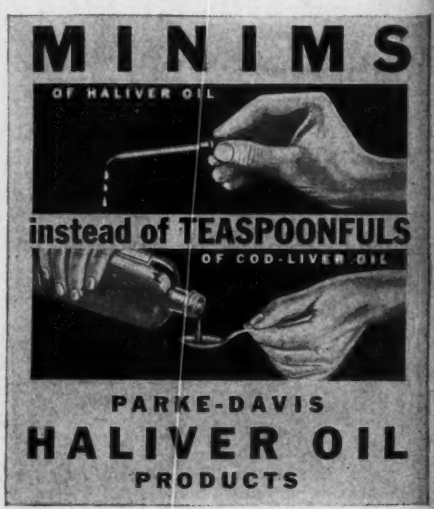
Containing at least one hundred times as much vitamin A and fifteen to twenty times as much natural vitamin D as high-grade cod-liver oil.

This new product is offered in response to a demand from physicians for a preparation containing an exceptionally high concentration of vitamin A in the smallest possible bulk. When certain cases call for large quantities of vitamin A, without a correspondingly large amount of vitamin D, the demand is met in this new product, Haliver Oil (Plain).

Both Haliver Oil with Viosterol-250 D and Haliver Oil (Plain) are supplied in soft, easily swallowed 3-minim capsules. Haliver Oil with Viosterol is also available in 5-cc. and 50-cc. vials, and Haliver Oil (Plain) in 10-cc. vials.



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